# CHARACTERISING HIGH-GROWTH FIRMS: PERSPECTIVES FROM THE ASIA-PACIFIC REGION

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## ABSTRACT

This study advances understanding of the complexity of high growth in technology-based businesses. The study builds on conceptual and applied insights on business growth from the entrepreneurship and strategic management literatures. This thesis uses both qualitative and quantitative methods to develop and then test a model of the performance of high-growth firms. The qualitative study involved case studies of high-growth firms in Malaysia and New Zealand and led to a conceptual model of their performance. This model was then estimated using original data gathered from a questionnaire survey of a cross-section of high-growth and non-high-growth firms. The model was estimated separately on samples of high-growth and non-high-growth firms and, as expected, it proved a much stronger explanation of the performance of the high-growth sample. Hence the thesis provides important new insights into this small but important group of firms.

Sixteen high-growth firms, selected in equal number from Malaysia and New Zealand, agreed to be case studies in the initial phase of the research. Interviews with the CEO/owners and other evidence from these firms led to a conceptual framework of their high-growth experience. This framework highlighted the importance of supportive government policies; internal human resources; external relationships/networks; and the ability of management to dynamically manipulate these resources. Further, the high-growth strategies: product innovation, market expansion, remaining-in-private-ownership and strategy flexibility were underpinned by five main capabilities: innovation, financial, human, marketing and organisational. Challenges from both internal and external environments also influenced growth performance.

This conceptual framework was the source of a number of hypotheses that were then tested using a statistically valid sample of firms. A survey was conducted on technology-based firms in the two countries. A total of 163 responses were collected from key decision makers in these firms. The empirical results showed different impacts of the dimensions mentioned in performance in the two countries. Due to limited responses in Malaysia (n=53), conclusions could only be made based on the New Zealand context (n=110). Product innovation was found to be a major strategy for

all technology-based firms regardless of their performance. However, the results suggest that growth challenges have greater influence on high-growth firms than on firms with lower growth. The model has significantly higher statistical power when applied to a sample of high-growth firms, confirming differences between the two groups.

This thesis has significant theoretical and practical implications. From a theoretical viewpoint, this study provides detailed evaluation on the growth determinants from a process perspective. All the resources identified in the qualitative study influenced some of the capabilities, and the innovation, marketing and human capabilities each had significant relationships with the growth strategies implemented. The performance of technology-based firms was influenced by three major strategies: market expansion, product innovation and remaining-in-private-ownership, and also by two growth challenges: financial barriers and external environment effects. The results also indicate that success of the market expansion strategy is tied to product innovation strategy, while remaining-in-private-ownership is positively related to performance. As such, technology-based firms should give priority to product innovation strategy in pursuing better performance. From a practical viewpoint, these findings indicate that the competitiveness of technology-based firms can be enhanced by working closely with key stakeholders who provide growth resources, and developing critical capabilities to assist the right strategies for better performance.

# CHAPTER ONE INTRODUCTION

## 1.1 Overview

This chapter provides some background on the technology-based firms in the Asia Pacific region, with the focus on Malaysia and New Zealand. The chapter develops the study's three research questions, scope and key terms, and its potential contribution.

## 1.2 Background of study

From the emergence of newly industrialised countries in the 1980s to becoming the world's largest technology contractors in the 1990s, the Asia Pacific region is now a dominant economic bloc. While the 2008 global financial crisis badly hit economic giants such as the United States and major European countries, Asia Pacific countries rebounded faster from the crisis. Reasons for this include foreign direct investment and export (Weber 2009), government policies (IMF 2009), strong domestic demands (Petri & Plummer 2009) and regional economic integration (Luo & Howe 1993). Governments also play an important role in shaping the key Asia Pacific economies (IMF 2009). Most of these countries were historically colonies, their gross domestic products were mainly primary resources and they were involved in low value-added economic activities. However, the success of the newly industrialised countries, especially Singapore, South Korea and Taiwan, has encouraged other emerging Asian countries to replicate the technology-driven and high-technology production-based pattern of development. As such, governments in countries like India, Malaysia, Thailand, Australia, New Zealand and China have invested heavily in technology industries (OECD 2008). Government initiatives include tax incentives, the setting up of science parks and technology institutions, allocation of research and development funding and relaxed regulations on the employment of qualified expatriates.

These initiatives have made Asia Pacific the largest information communication technology exporters in the world (WDI 2009). For example, Taiwan has established a science park that is the only one in the world successfully replicating the Silicon Valley (Lubman 1999). Korea, Taiwan and China have developed well-known technology brands such as Samsung, Acer and Lenovo. The technology industry has grown to be

one of the important economic pillars in many Asia Pacific countries. As a result, many technology-based firms have achieved high growth performance. This is evidenced by the Deloitte Technology Fast 500 Asia Pacific Ranking. Deloitte Touche Tohmatsu launched this program to recognise the high growth of technology industries in Asia Pacific since 2002. It called on firms in technology industry, ranging from semiconductor, telecommunications, internet, software and hardware, biotechnology, pharmaceutical, media and entertainment and green technology, to participate annually (Deloitte Touche Tohmatsu 2008). The award to an individual firm is based on its revenue growth over the previous three years. Few firms sustain their ranking for more than one period of three years. There were many studies conducted by scholars around the world focusing on the development of this industry (Kreamer & Dedrick 1994; Hobday 2002). However, there has been no specific study of how these technology-based firms achieve high growth performance, and that is the focus of this research.

Based on initial analysis on Deloitte Technology Fast 500 Asia Pacific Ranking, several countries in Asia Pacific have dominated the ranking since its inception. They are Taiwan, Korea, Japan, India, Australia, New Zealand, Malaysia, China, Singapore and Thailand. From the latest four rankings, ranging from year 2006 to 2009 (Appendix A), several observations were made:

- Taiwan continues to be the largest contributor of high-growth technology-based firms.
- China increasingly shows a high number of technology-based firms whereas Korea faces sharp decline after the financial crisis of 2008.
- India, Australia and New Zealand are steadily growing at a lower percentage than China.
- Malaysia's production of high-growth technology-based firms is declining incrementally from year to year.

Based on their geographical locations, Australia and New Zealand have market disadvantages compared to countries like Malaysia and Singapore. They are located far from the large and fast growing giants like India and China. However, this has not deterred the development of the technology industry in both countries. With a more open migrant policy in recent years, Australia's population has grown to 22.9 million

based on year 2012 statistics, whereas New Zealand had only 4.4 million in the same year. New Zealand's technology industry therefore faces more challenges due to a smaller domestic market size than Australia. On the other hand, countries such as Malaysia, Singapore and Thailand, which are in strategic locations in the region, did not develop many high growing technology-based firms. Political instability in Thailand and land constraints in Singapore is persistent challenges for both countries. Malaysia has enjoyed political stability, rich resources and a series of government incentives for technology industry, but has fewer technology high growers.

Apart from that, high growth businesses in New Zealand have also faced many challenges in maintaining their business performance. Data provided by Statistics New Zealand (Appendix B) on high-growth enterprises showed that the number of enterprises in this category declined from year 2005 to 2011. The definition of high growth enterprise (HGE) in New Zealand is similar to that of the OECD-Eurostat (2007) and Deloitte Technology Fast 500 Asia Pacific Ranking. According to Statistics New Zealand (2011), high growth enterprise for a particular year (t) refers to the number of enterprises:

- whose number of employees have grown by 72.8% cumulatively in the preceding 3 years (an annual average growth rate of 20 per cent),
- had 10 or more employees at the initial year (t-3),
- were alive in the business demography population every year between (t-3) and t,
- were not subjected to any merger or split of their ownership structure during the preceding 3 years and
- were not employer enterprise births in the initial year (t-3).

Referring to Table 1 in Appendix B, there were 1,125 high growth enterprises in year 2005 but the numbers had dropped to only 700 in year 2011. There was a drop of at least 5% in high growth enterprise from year to year. The biggest percentage drop happened between years 2008-2009 where it decreased 17.56% (from 1067 to 879). In addition, it was found that majority of the high growth enterprises in year 2005 did not sustain their growth in subsequent years. Referring to Table 2, there was more than a 60% HGE drop-out from the category in the following year. Five years later only 25

firms sustained their places in the high growth category. Similarly, 70% of HGEs in year 2008 dropped out from the category in the following year. Three years later, only 30 firms remained. The lack of ability to sustain high growth in New Zealand firms is rather disappointing but may not be unusual. The statistics showed that about two-thirds were HGEs for only one period of three years. Though most of them continue to operate, their businesses failed to achieve continued high growth rates. As the statistics represented all industry in the country, it does reflect the specific difficulties of technology-based firms in maintain business growth. Comparing Appendix A and B, the highest percentage of decreases in HGE was between years 2008-2009, while New Zealand technology-based firms had the highest number in the Deloitte ranking in year 2009. This indicates that New Zealand's technology industry had performed better than other industries in a challenging economic environment.

Studies of high-growth business started with Birch (1979) when he commented that high-growth firms created more job opportunities than other firms. There is on-going debate on this notion as there were diverse results on the job creation abilities of high-growth businesses. Hence it is vital to have a deeper understanding of the growth experiences of technology-based firms, including those exceptional firms that have been recognised more than once in the Deloitte Fast 500 Asia Pacific Ranking.

### 1.3 Technology Industry in Malaysia

Malaysia's aspiration to create an economy that is technologically proficient, and fully able to adapt, innovate and invent was the vision of the previous Prime Minister Mahathir in 1991 (Felker & Jomo 1999). From this aspiration, Malaysia has made extra efforts to develop its technology industry. The country's budget for technology has grown sharply in order to reform the nation's system of technology support institutions, laboratories and universities. Incentives for research and development and high technology investments are also offered to private sector technology development. Technology parks such as Kulim High-Tech Park, Technology Park Malaysia and Multimedia Super Corridor were established in the 1990s to attract high technology-based firms (Lai & Yap 2004). At the same time, the government set up a new ministry called the Ministry of Science, Technology and Innovation (MOSTI) to formulate policies and promote national research and development activities.

Establishment of the Multimedia Super Corridor (MSC) in the year 1997 can be considered the most exciting initiative in Malaysia's technology policy. MSC aims to draw in multimedia software development ventures from the leading international firms. Malaysia's government invested billions of ringgit to support technology-based firms with MSC status. Other incentives include a 100% tax exemption for a period of ten years, no restrictions on the foreign personnel a firm can hire and lucrative procurement contracts from government. To date there are more than 2000 technology-based firms with this status. Though these firms have contributed more than RM 5 billion export sales (MSC 2008), their potential competitiveness is still largely at local level. This implies that after ten years of nurture the majority of MSC-status firms still lack competitive advantage in the global market.

Based on Deloitte Technology Fast 500 Asia Pacific Ranking from year 2006 to 2009, there were 61 Malaysian firms with high-growth status. The downward trend shows that Malaysia had 24 firms with this status in 2006, 17 firms in 2007, 12 firms in 2008 and only 8 firms in 2009 (Appendix A). Of these firms, less than 50% were in the ranking for two consecutive years. All these firms enjoyed MSC status for many years. The ranking again indicates that technology-based firms in this country require further investigation. As technology industry contributes about 10% (MSC 2008) to the Malaysia economy, it is important to understand the growth experiences of this industry.

### 1.4 Technology Industry in New Zealand

Despite the relatively small size of its economy, New Zealand has a reputation of being an early adopter of information technology. Prior to year 2000, the New Zealand government did not provide the industry-specific support for technology industry that other countries in the Asia Pacific region did. Kreamer & Dedrick (1993) commented that the lack of government support policies in this industry would not bode well for the future of New Zealand in world markets. However, another study conducted by Ein-Dor, Myers & Raman (1997) noted several positive signs in New Zealand's technology industry. Though the country lacked expertise in hardware manufacturing, many entrepreneur-owned telecommunications and software development firms had developed state-of-the art products and services for global markets. Besides, many of

these firms successfully formed strategic alliances for worldwide marketing with multi-national corporations.

In year 2000, government developed a Growth and Innovation Framework which placed innovation as a dominant factor in its economic policy. Since then this country has been actively involved in research and development. The government is aware of the importance of science and technology in escaping the 'low productivity trap'. Therefore, efforts were made to improve international competitiveness and lift the firms' technological capabilities (OECD 2007). For example, the Foundation for Research, Science and Technology allocated NZ$500 million annually to invest in science and technology research to improve welfare of citizens. Besides government, small and medium enterprises also played an important role in New Zealand research and development activities (OECD 2008). As a result, sales of technology products and services contributed around 9.9% of the country's gross domestic product. There were about 2,974 enterprises involved in these technology sales (Statistics New Zealand 2009).

The New Zealand government does not offer tax incentives, and its research and development expenditure is only 1% of GDP (OECD 2006). Furthermore, New Zealand is highly selective in providing support to private enterprise; however, New Zealand's technology industry still contributes significantly in terms of high-growth firms. Among the 50 winners in Deloitte Fast 50 ranking for New Zealand in year 2009, 20 of them are in the technology industry. This implies that there are bright prospects for the industry despite the unfavourable conditions. There were 51 New Zealand (Kiwi) firms ranked in the Deloitte Technology Fast 500 Asia Pacific Ranking 2009. This number increased about 60% from the previous year, while other Asia Pacific countries such as Korea and Taiwan contributed fewer high-growth firms. The latest ranking showed that among the 51 ranked companies, 17 had won previous ranking. This suggests that sustained growth is possible in the New Zealand technology industry, and therefore it is important to investigate what has contributed to this performance.

### 1.5 Importance of Technology Industry in other Asia Pacific countries

Based on the discussion of technology industries in Malaysia and New Zealand, it is obvious that government has played an important role in developing technology industry. There are also frequent debates on whether government has over-emphasized this particular industry because of its growth potential (Greene 2012; Stam, Suddle, Hessels & Van Stel 2007). Though Mason & Brown (2011) pointed out that many policymakers have wrongly assumed that technology sectors are the main source of high-growth firms and technology-based firm have a high tendency to growth, it is undeniable that government policies provided many useful resources for growth across industries including the technology industry. For a more comprehensive view on a government's role in the growth performance of technology-based firms, further investigations on various government technology policies are required. Table 1-1 summarises some government policies (OECD 2008 and 2010) which promote technology and innovation in other major Asia Pacific countries. These governments also place high emphasis on nurturing and growing national innovation capabilities. All these policies have affected the growth of technology industries by opening growth opportunities and providing extensive resources to technology-based firms.

**Table 1-1 Reviews Of Government Policies in Asia Pacific OECD Countries**

| Country | Policies to promote technology and innovation |
|---|---|
| **Australia** | Prior to the 1990s, government innovation policies (mostly through the Australian Industrial Research and Development Incentives Board) were found to be less effective as the country still had a high dependence on foreign technology and there was a lack of standardisation between federal and state governments. After the 1990s, the National Innovation System aimed to increase science and technology expenditure, promote business sector involvement in research and development and lower dependence on foreign technology. Since then, the government has lined up a series of national plans (2004-2010 then 2009-2020) to promote innovation. Two notable policies include 1) offering grants of AUD 50000 to AUD 250000 for innovation projects to small and medium enterprises, companies controlled by Australian universities and public sector research organisations 2) Premium R&D tax concessions, thereafter R&D tax credit offered to all firms, regardless of where the intellectual property is held. This initiative encourages multinational companies to carry out their research activities in Australia. |
| **China** | The National High Technology Research and Development Program launched in 1986 were followed by the Torch Program in 1998 to promote innovation and technology in the country. The government also established technology parks in 53 major cities which allowed firms to enjoy corporate tax exemptions for two years. Government has a comprehensive innovation plan under the National Guidelines on a Medium and Long term programme for S&T development (2006-2020). Notable policies from the plan include:<br>1) Tax incentives: 150% deductions for R&D expenditures; venture capitalists providing capital to high technology SMEs can receive a tax bonus. |

| | |
|---|---|
| | 2) Public procurement: the government gives priority to indigenous innovative products and spends no less than 60% of its technology procurement budget on domestic firms.<br>3) Industrial research alliance: the government supports alliances among enterprises, universities and national research institutions.<br>4) Human capital: a number of schemes have been launched linking academics with industry and promoting the return of overseas Chinese students.<br>5) Intellectual property: the government issued the "Outline of the National Intellectual Property Strategy" and laid aside RMB 100 million to subsidise Chinese international patent applications. |
| **India** | Though government provided 100% R&D tax credit, the major source of financing technology projects is from developmental financial institutions through venture capital. The Science and Technology in the Tenth (2002-2007) and XIth Five-year-plan (2007-2012) aimed to increase R&D spending to 2% of GDP, strengthen intellectual property registration, promote international co-operation, better link public research to business needs, and give top priority to primary and higher education, research and innovation in the agricultural sector. The country has limited financial resources to offer in building innovation capability. However, India's software industry has experienced rapid growth, much of it based on outsourcing from US and EU countries. Low labour costs and English language proficiency also creates many opportunities for the country to enjoy technology transferred from developed countries. |
| **Japan** | The government has consistently offered tax credit for R&D expenditures to encourage private investment in research activities. The Industrial Cluster Project offers direct R&D support for R&D consortia, subsidies and incubation service and indirect networking/coordination support. This country is considered the most technologically advanced in the region. It has successfully created many world-renowned innovations. It still places high importance on innovation through its national plans, Innovation 25 (2007-2025) and New Growth Strategy (2009-2020). Innovation 25 emphasises i) a pioneering project for accelerating social returns; ii) promotion of strategic R&D in individual fields; iii) diversification of basic research; and iv) strengthening the R&D system. Under its New Growth Strategy, Japan shifts from scientific innovation to demand-pull innovation (low carbon society, ageing) in four strategic fields: biotechnology, ICT, nanotechnology and environment.). |
| **South Korea** | The government plays a very important role in promoting innovation. In the late 1980s the Korea government implemented a systematic program of tax credits, preferential financing and R&D subsidies. In addition, half of the R&D spending in semiconductors, computers, telecommunication and software take place in the government sector. The Korean government used subsidised credit and rationed it in a highly selective manner to favour sectors and companies in strategic industries. In 2007, the Korean National Science and Technology Council approved its second five-year S&T basic plan (2008-12) which aims to help Korea become one of top five countries by 2012 in terms of S&T competitiveness. The plan sets major policy directions: to move from the existing follower/imitative innovation system to a creative/pioneering innovation system, and to target 100 strategic technologies for the creation of future growth. In 2009 this tax credit became permanent and the preferential tax credit rate for SMEs was raised from 15% to 25%. In 2010, a 20% preferential tax credit rate is expected for new-growth-engine R&D (30% for SMEs), and a 25% preferential tax credit rate is expected for original-sourcing-technology R&D (35% for SMEs). ICT is one of the main national priorities in research and innovation policy. |

*Source: Summarised from OECD (2008 and 2010)*

As well as the OECD countries listed above, Taiwan also provides a successful example of how government can influence the technology industry (Dodgson,

Mathews, Kastelle & Hu 2008). Since the early 1990s Taiwan's government has supported innovation in the technology industry through appointed key agencies such as Industrial Technology Research Institute (ITRI), Hsinchu Science Park (HSP), Electronics Research and Services Organisation (ESRO), Science and Technology Information Centre (STIC) and the National Science Foundation. Co-located with National Tsing Hua University and Chiao-Tung University, these agencies have implemented many effective measures such as tax incentives, low interest loans, research and development and manpower training grants and duty free importing of equipment and materials. As a result, ITRI has more than 60,000 patents in force worldwide and has helped more than 30,000 firms in Taiwan today (Greenhalgh & Rogers 2010). This shows that government plays a significant role in technology industry, especially with small and medium technology-based firms that face resource constraints.

### 1.6 Statement of Problem

Information communication and technological goods and services have been among the most dynamic components of international trade over the last decade (OECD 2009). The technology industry is in a highly uncertain and competitive environment (Marksman, Balkin, Schjoedt & Autumn 2001), and it is technology change that creates new opportunities in the forms of un-met needs and demands. There are still many untapped potential markets for technology industry. These markets represent growth possibilities for every technology-based firm. Though there were several studies on growth determinants of technology-based firms in United States and Europe (Fesser & Willard 1990; Keogh & Evans 1999; Cooney 2009), there is limited literature on how technology-based firms achieve high-growth performance. As the region that supplies most of the technology exports in the world, the Asia Pacific region merits specific study on the high-growth experiences of technology-based firms.

With constraints on technological expertise and slower technological development compared to United States and Europe, the Asia Pacific region faces special challenges in terms of its resources and capabilities (Chen & Yuan 2007; Lee, Lee & Pennings 2001). The technology industry is relatively high in resource mobility, especially in human resources and expertise. For example, a software development firm

headquartered in Kuala Lumpur might have system consultants from India running a project in China. Many technology-based firms are involved in strategic alliances and systems integrations with other technology partners. It is important to understand the environment, resources, capabilities, strategies and challenges of high growth technology-based firms and to identify the characteristics of above-average performance. Studies of high-growth firms usually adopt either a qualitative or quantitative methodology based around a limited number of themes or dimensions (Henrekson & Johansson 2009; Moreno & Casillas 2007; Barringer, Jones & Lewis 1998). There are limited studies that differentiate firms with contrasting growth performance, for example high growers and non-high growers. Hence the current reviews are usually skewed and only provided partial pictures of growth. This study contributes to a more comprehensive understanding of high-growth technology-based businesses.

### 1.7 Research Questions

The main purpose is to find out how technology-based firms achieved high-growth performance and whether the way they relate to environment, resource-capabilities and strategies can explain differences in performance. It also seeks to establish any differences between high-growth firms and slower-growing firms in relation to environment, resource-capabilities and strategies. The three research questions that guide the research are as follows:

1) What are the key characteristics of high-growth technology-based firms in these countries?
2) How do high-growth firms differ from non-high-growth firms?
3) What are the influences of resource-capabilities, strategies and growth challenges from the internal and external environment on performance?

### 1.8 Potential Contributions of Study

This study offers insights to managers of technology-based firms specifically and other businesses generally on how to build their businesses to achieve high-growth performance. By examining the relationship between resource-capabilities, strategies and growth challenges to performance, this study suggests actions required to prioritise

the growth elements. Any firm operating in a volatile industry in an uncertain environment can learn from the experiences in these case studies as well as from the statistical findings.

This study also seeks to suggest suitable strategies for policy makers to assist technology industry generally and high growers specifically. Many countries would like to replicate success models found around the world to help shape their own economy structures. Findings from the study can assist in developing growth and technology policy for countries especially in the Asia Pacific region facing similar conditions.

### 1.9 Scope of Study and Justification

Business growth has received much attention over the last two decades, especially in the entrepreneurship literature (Willard, Krueger & Fesser 1992; McMahon & Davies 1994; Fischer & Reuber 2003; Janssen 2009; Keen & Estemad 2011). As mentioned earlier, high-growth business is widely pursued by business owners and therefore has a significant position in strategic management literatures as well. Building on key theories in strategic management such as resources-based view, strategy-performance and environment (discussed in Chapter 2), this study links entrepreneurship and strategic management concepts to examine the interrelation of these concepts. Technology industry is one of the most dynamic industries in world economy. Therefore, it is appropriate to conduct a study on high-growth business and the influence of strategic management on this particular industry.

The Asia Pacific region has caught the attention of the world, especially after the recent financial crisis. Its fast recovery from crisis and strong growth in gross domestic product has demonstrated the strong economic fundamentals of the region. As the Asia Pacific region is the largest technology producer and services exporter, it is chosen as the focus of this study. At present the Deloitte Technology Fast 500 Asia Pacific Ranking is the only one closely relevant to this study, and hence it is used as a background for further investigation.

This study investigates the growth experiences of technology-based firms in chosen countries located in Asia Pacific region. Using a exploratory sequential mixed methods design, the study first explores qualitatively a sample of award winning high-growth firms. It then moves to determine if the qualitative findings generalise to a large statistically-valid sample. The first phase uses interviews and other supporting data from sixteen award-winning high-growth firms in the Asia Pacific. From this initial exploration, the qualitative findings will be used to develop measures that can be tested in a large sample. In the quantitative phase, questionnaire data are collected from a cross-section of all technology-based firms in the chosen countries.

Due to the nature of an in-depth study looking at process and content, case study research is considered most suitable. With more than 20 countries in Asia Pacific region that are involved in technology, a more specific scope is needed. Malaysia and New Zealand have been chosen as case studies after looking at the ranking trend and considering factors such as geographical locations, government interventions and industry profiles. As mentioned in section 1.1, the contrasting situations in the two countries could provide interesting insights.

The second part of this research confirms findings from the case studies. Survey data are used to test the hypotheses developed in first part of the study. Respondents for this quantitative study would be all the technology-based firms in Malaysia and New Zealand. Based on the quantitative results gathered in the survey, a high-growth business model that considers comprehensive aspects of growth is developed.

### 1.10 Definition of Terms

The terms usually used in this study are defined as below:

***Fast/high-growth*** – there are several methods of measuring a firm's growth. In this study, a high-growth firm is defined as 'an enterprises with average annualised growth in turnover greater than 20% per annum, over a three year period and with more than 10 employees in the beginning of the observation period' (OECD 2010).

***Sustained growth*** –sustained growth in the study refers to the experience of high growth for a period of time. In this study, a business experiencing more than three years of high growth is considered to have sustained growth.

***Resources*** **–** refers to tangible and intangible inputs that are used to create growth opportunities within a business. In this study, tangible inputs include financial resources, human resources and other physical resources. Intangible inputs consist of intellectual/technological resources, reputation and knowledge.

***Capabilities*** **–** refer to a firm's abilities to orchestrate such resources in the most efficient and effective way.

***Strategies*** – strategy is the set of actions/plans that a firm uses to gain competitive advantage.

***Challenges***- refer to constraints and opportunities from the internal and external environment that affects a firm's performance.

***Environment*** **–** refers to the forces and conditions that can influence the organization's performance (Robbins , Bergman, Stagg & Coulter 2006). In this study, it includes both the external environment (government, customers, competitors, economic, network and the industry) and the internal environment (resource-capabilities, human resources practices, top management, organizational structures and cultures, innovation and marketing).

***Technology industry*** – The OECD (2006) defined the information communication and technology sector as manufacturing and services relating to computing, telecommunication and software. There is no specific requirement for research and development expenditures on this category. However, it is assumed that the firms in this industry are involved directly or indirectly in research and development. In this study, the technology industry includes not only businesses within the scope of the OECD definition but also those concerned with pharmaceuticals, biotechnology, media and entertainment, and green technology.

### 1.11 Summary of Chapters, and Organization of Remainder of Report

This thesis is organised into seven chapters. An overview of each chapter is described below along with a presentation of the overall outline in Figure 1.1.

The first chapter reviews high-growth technology-based firms in the Asia Pacific region. It also specifically examines high-growing technology-based firms in Malaysia and New Zealand. The chapter presents a problem statement, research questions, and the purpose, significance, scope and justification for the study.

The next chapter examines previous research on the relevant topics. All issues pertaining to the research methodology and design are explained in Chapter Three. The findings of the qualitative case studies (Study 1) are presented in Chapter Four. The following chapter discusses results from the quantitative survey (Study 2) of technology-based firms in New Zealand and Malaysia. Subsequently, discussions on research questions and study implications are presented in Chapter Six. The last chapter presents the conclusions, study limitation and recommendations for further studies.

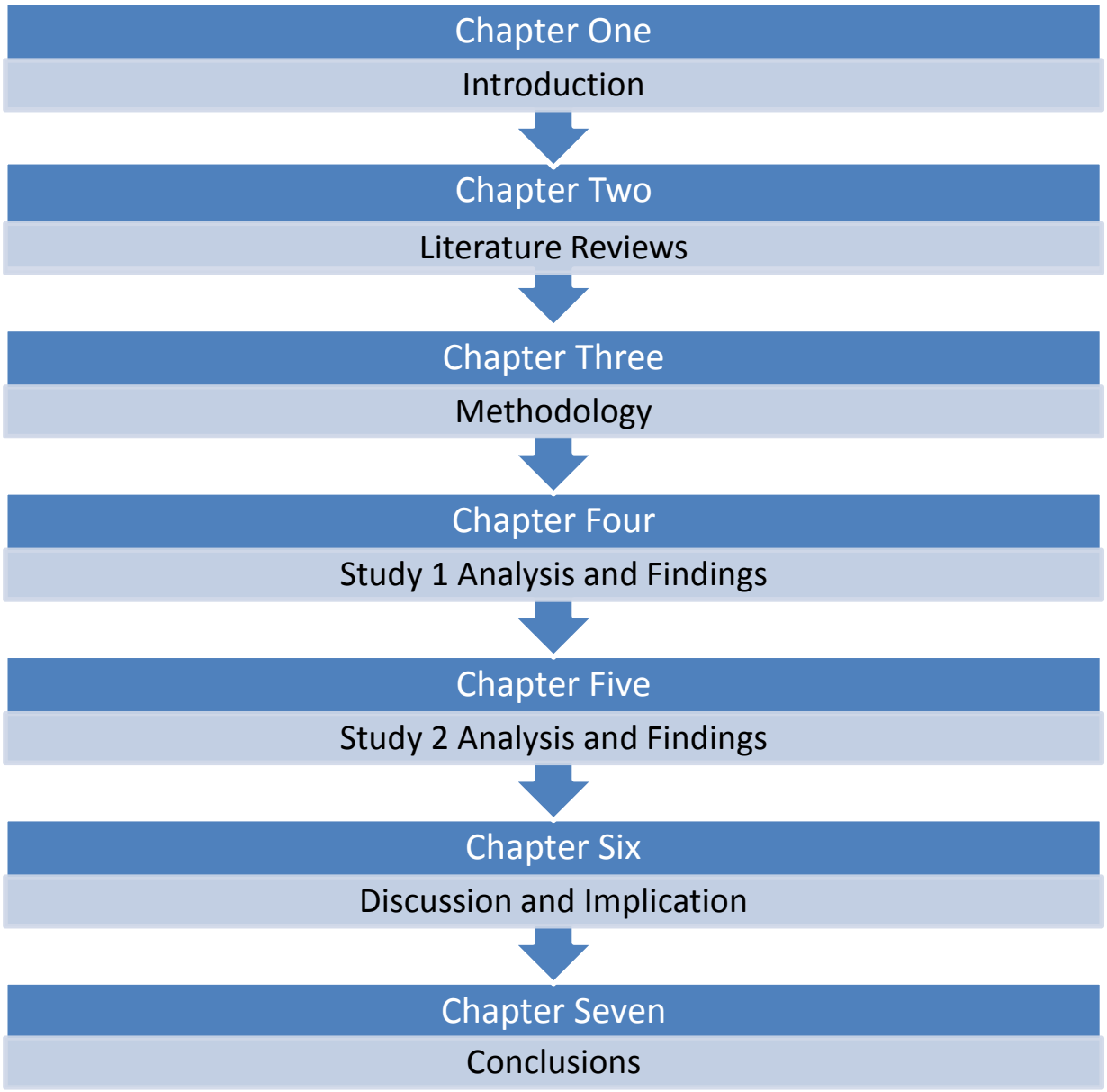



**Figure 1.1 Overview of Thesis**

# CHAPTER 2 LITERATURE REVIEW

## 2.1 Overview

The purpose of this literature review is to provide a macro-level understanding of three important elements in this research: high-growth performance, growth dimensions and technology-based firms. The review is narrative and draws on key studies that provide insights and guidelines for this study.

Several electronic databases and printed materials were used to find relevant information. Among the electronic databases were: Science Direct database, ProQuest database and Emerald Management. From these databases, journals such as *International Small Business Journal*, *Strategic Management Journal*, *Small Business Economics*, *Journal of Business Venturing* and *Academy of Management Journal* were accessed. Several government technology policies websites were also studied. The keywords used to search for materials were: high-growth/fast-growth business, gazelles, growth resources, capabilities, strategies, environments, growth challenges, and technology industry in the Asia Pacific region.

This literature review is divided into three main sections: firm growth, technology industry and growth dimensions. Under each section, there are sub-sections explaining related issues surrounding the main topic.

## 2.2 Firm Growth and Theory

There are several ways of measuring business success and performance. Neely, Adams & Kennerley (2002) recommended a performance prism that integrated five perspectives: stakeholder satisfaction, stakeholder contribution, strategies, processes and capabilities to measure management performance. Similarly, Chakravarthy (1986) also highlighted the importance of measuring strategic performance by comparing different methods: financial measures, stakeholders' satisfaction, quality of firm's transformation and composite measures of performance. On the other hand, Headd (2003) redefined business success based on closures and failures. In order for a firm to satisfy its stakeholders, its ability to survive in the competitive market place is

essential. Thus, it is not surprising that firms seek to achieve consistent growth performance in sales, profitability and market share.

This quest for growth has been recognised by many economist and business strategists in the last 50 years. Penrose (1959) in her book *The Theory of the Growth of the Firm* provides reasons why some firms perform much better than others. She links growth performance with a firm's ability to align its resources and market opportunities. Hence a firm's growth is strongly driven by internal and external forces. The resource-based view was developed on the basis of her work. This theory, which widely discusses the value and characteristics of resources owned by a firm, was first formalised by Rumelt (1984), Wenerfelt (1984) and Barney (1986). It is believed that resources that are valuable, rare, hard-to-imitate and non-substitutable (VRIN) can underpin a firm's competitive advantage for a period of time. These attributes of resource and capability could provide sustained competitive advantage to a firm. This sustained competitive advantage allows the firm to gain above-average performance compared to its competitors. Many scholars (Wernerfelt 1984; Barney 1991; Peteraf 2006; Anderson & Kheam 1998) recognise the impact of resources on a firm's growth. It can therefore be assumed that resource-based theory plays a key role in the study of business growth.

There is much research based on resource-based theory: Edelman, Brush & Manolova (2005) and Chandler & Hanks (1994a) have pointed out the importance to performance of 'fit' between resource-capabilities and strategies; Carmeli & Tishler (2004) have linked specific capabilities to a firm's performance; and Galbreath & Galvin (2008) prove the power of resource-based theory over industry factors. Most of these studies use a set of pre-determined resources and strategies to prove the impact on a firm's performance. As Barney & Clark (2007) comment, resource-based theory is a path-dependent phenomenon so it is important to find out what previous decisions and efforts were made by the firm to reach its performance outcome. Although current literature recognises the existence of business resources, there is limited discussion of where such resources originate. Understanding the sources of valuable resources would help managers to exploit opportunities and extend their competitive advantage for a longer period of time. In addition, Barney & Clark (2007) state that case studies of firms in a single industry have more potential to generate insights about resource-based theory than large sample, cross-sectional work. Prior to this, Priem and Butler (2001)

also argue that limited work has been done to evaluate strategic resources based on one industry. By focusing on one industry, they suggest it will offer more accurate measurement of strategies and firm-specific resources. Hence a more in-depth approach should be conducted to expand empirical work on resource-based theory in a single industry.

As well as resource-based theory, many strategic management scholars have connected the study of firm growth to strategy. Gundry & Welsch (2001) suggest that high-growth firms pursue market expansion and organisational development strategies; Guan & Ma (2003) argue that export growth is related to innovation strategy; and Mosakowski (1993) identifies the importance of focus and differentiation strategies in high-performing firms. Porter's framework (1980) associated cost leadership or differentiation strategies with superior business performance, and Ortega (2010) provides empirical support for this in the Spanish context. Weinzimmer's (2000) analysis supports relationships between organisational growth and the correct alignment of strategic aggressiveness and the age of management teams, proving that a business with a young management team and aggressive strategies will have faster growth. This study also suggests a relationship between organizational growth and the correct alignment of industry growth and strategy. This implies that if the firm is in a growing environment, more resources should be allocated to exploit growth opportunities. The aforementioned studies were conducted across industries and provide rather fragmented results, however; they do provide strong evidence that strategy does influence business growth.

Apart from the specific factors mentioned earlier, industry and environmental factors were also found to influence business growth. There is on-going debate over whether business or industry factors have a greater effect on performance. In contrast to the studies mentioned in earlier paragraphs, there are a number of studies that emphasise how industry factors influence a firm's performance. Porter's work on the five competitive forces (1980) demonstrates the strong industry influence. The specific attributes of an industry influence the entrepreneurial decisions of a firm and its ability to achieve above-average performance. Wernerfelt & Montgomery (1988) and Schmalensee (1985) found that the effect of industry was greater than the effect of a firm on performance. MacMillan & Day (1988) and McDougall, Covin, Robinson &

Herron (1994) also argue that the most successful start-ups are those launched in the growth stages of an industry's life cycle. Resources and capabilities belonging to a firm could be regarded as static factors while industry competition brings volatility to the business. As a result, resources and capabilities which were found to be able to provide competitive advantage to a firm could not be sustained for long. The dynamism reflected in the external environment is often viewed as a growth challenge.

The current literatures are limited in their abilities to integrate resource-based theory, competitive strategies and environment impacts on business growth. Most of the studies discussed here have tried to link theories with performance outcomes at a single point in time. With the advancement of technology and globalisation, resources have greater mobility and are more easily imitated; often a firm does not employ a single strategy for any length of time and business environments are becoming unpredictable. It is therefore becoming more difficult for a firm to achieve above-average performance, and less possible to sustain high growth over a longer period of time.

### *2.2.1High-Growth Firms*

In addition to the understanding of business growth, there is now a separate focus on firms that have achieved above-average growth, i.e. high-growth. It is believed high-growth firms are generating more job opportunities in the economy (Birch, Haggerty & Parsons 1995). There are a number of terms used to describe extraordinary growth performance such as high, fast and rapid. Furthermore, there are various definitions for the group. Barringer, Jones & Neubaum (2005) considers rapid-growth firms to be firms that consistently grow at a rate that exceeds the GDP. On the other hand, Barbero, Casillas & Feldman (2011) classifies high-growth firms as those that had experienced a minimum annual growth rate of 10% during the five-year period. Another widely-accepted definition is that of the OECD (2007, 2010) which defines a high growth firm as:

> *'an enterprises with average annualised growth in turnover greater than 20% per annum, over a three year period and with more than 10 employees in the beginning of the observation period'.*

On the other hand, Cooney & Malinen (2004) have differently defined fast growth and high growth, although both terms are used interchangeably in most literatures. They

have argued that fast growth applies to the speed of growth over time while high growth measures the absolute amount of growth. Despite these differences, the elements used to define the high-growth firm reveal that special attention should be encouraged due to its significant contribution to economic development through sales, turnover and employment. As business is moving faster with the help of technology that creates a borderless marketplace, high growth may seem to be easily attainable. However, global market competition and advancing change in the marketplace suggest that high-growth performance is attainable only in the short term. Thus, high growth and especially sustained high-growth performance is rare, but worthy of investigation.

High-growth studies started when Birch (1979) categorised firms with rapid growth as gazelles. Although these fast-growing enterprises represent only 3-5% of all firms in the United States, they make a disproportionate contribution to wealth creation and employment (Nicholls-Nixon 2005). This group is considered as a subset of high-growth firms. The study of gazelle firms has received much attention from countries such as United States, Canada, Germany, Finland, France, Spain and Italy. These countries have established comprehensive databases to review the performances of fast-growing firms. Due to differences in economic standards, they have a slightly different definition of gazelles (Birch & Medoff 1994, Bruderl & Prisendorfer 2000 cited by Henrekson & Johansson 2009). However, these previous studies recognised the role of fast-growing firms in job creation. In a study conducted by Henrekson & Johansson (2009), a meta-analysis of empirical evidence confirms that gazelles are generally young and small and that they exist in all industries. Although there were perceptions that gazelles were over-represented in high-technology industries, the study reveals that it is not true, but there is some evidence they might be over-represented in service industries. In addition, Almus (2002) found that technology-intensive manufacturing branches and knowledge-based business related services do not generate the majority of high-growing firms. On the other hand, Acs, Parsons & Tracy (2008) carried out a similar study to distinguish gazelles from ‘high-impact’ firms. These high-impact firms are rare, relatively old, and contribute most to overall economic growth. A high-impact firm is an enterprise whose sales doubled over the most recent four-year period and with an employment growth quantifier of two or more over the same period. It is interesting to note that these high-impact firms exist in all industries and almost all regions, states and counties. There is no definite category/baseline on gazelles and

their differentiation from other growing enterprises. However, gazelles are considered important phenomena that improve a country's employment rate.

There were a number of studies that tried to link the characteristics of a firm with its high-growth performance. Acs & Mueller (2008) based on United States Metropolitan Statistical Areas (MSAs) found that start-ups with greater than 20 and less than 500 employees had consistent effects on employment. These effects are significant only in large diversified metropolitan areas. The study also indicates that new establishments have a strong positive effect on employment the year they enter the market, but the effects decrease over time. Similarly, Jovanovic (1982) also proposed that younger firms would have higher growth rates. Young firms are considered more innovative, proactive and faster-growing than older firms (Lumpkin & Dess 1996; Yasuda 2005). Furthermore, Moreno & Casillas (2007) observed that smaller-sized firms achieve higher growth rates. Davidsson, Kirchhoff, Hatemi-J & Gustavsson (2002) also showed that business age, initial size, ownership type, industrial sector and legal structure are key growth factors. Younger, independently owned and smaller-sized firms usually grow faster across all industries. However there were mixed results when the size and age of a business was related to growth performance. Hamilton (2011) found that newness appears to be more relevant to continued growth. His findings show that the age of a firm does not have much impact on growth as the effects of newness do erode. He also suggests that the size of a firm does affect its growth path, and that smaller firms show more continuous growth than larger firms. Further, Mason & Brown (2010) discovered that the majority of the high-growth firms in Scotland were older medium and large enterprises. Prior to this Smallbone, Leigh & North (1995) justified their finding that size; sector and age characteristics were not growth determinants. The debate about whether the characteristics of a firm can be used to predict growth outcomes has been going on for more than two decades but no consensus has been reached. It is proposed in this study that a high-growth firm is differentiated from others more by the strategies and actions of its managers than by the characteristics of the business.

Another group of scholars (Baum & Locke 2004; Barringer et al. 2005; Lee & Tsang 2002; Moran 1998) tried to relate owner/manager attributes to a firm's growth performance. In a study conducted by McPherson (1996), the educational level of the

entrepreneur has been found to have a positive effect on the growth of a firm. Siegel, Siegel & Macmillan (1993) found that the managers' experience in similar industry had a significant impact on a firm's growth regardless of its size and age. This is consistent with Bates (1990) who relates the human capital of the founder/owner to the speed of growth, especially in small businesses. Similarly, Storey (1994) in his analysis of the growth of small firms has identified three important elements: characteristics of entrepreneurship, characteristics of organization and types of strategy associated with growth. On the other hand, Cliff (1998) discovered that female entrepreneurs were more concerned about the risks associated with fast-paced growth and tended to adopt a slow and steady rate of expansion. In addition, female entrepreneurs were more likely to establish a maximum business size threshold and this threshold was usually smaller than that set by male entrepreneurs. This study noted differences between male and female on attitudes towards growth. Growth aspirations and the entrepreneurial orientation of business owners were also frequently discussed in high-growth business literatures (Baum, Locke & Smith 2001; Andersson 2003; Wiklund & Shepherd 2003b; Stam & Wennberg 2009).

On the other hand, Boston & Boston (2007) suggest that differences in the growth rate among African American owned businesses cannot be explained by owners' attributes, firms' attributes, and characteristics of markets or environmental constraints. The study follows Kim & Mauborgne (1998) and suggests exploring the roles of strategy and innovation in determining the growth of a firm. In addition, Smallbone et al. (1995) suggest that active strategies, highly competitive environments and product innovation are factors that differentiate high-growth firms from low-growth firms. According to them, innovation in crafting a value-based strategy is far more important. High growers worked on value innovation logic along five dimensions: industry assumptions, strategic focus, customers, assets and capabilities, products and service offerings. Innovation is another key aspect related to business growth. This is supported by Holzl (2009) who argues that high-growth small medium enterprises (SMEs) are more innovative than non-high-growth SMEs in countries close to technological frontiers. He surveyed most of the countries in the Europe. Mason, Bishop & Robinson (2009) found that innovative firms grow twice as fast in employment and sales as firms that fail to innovate. They confirm the link between innovation and high growth in United Kingdom city-regions. Besides innovation strategy, there is increasing research

investigating the role of other strategies in high-growth firms. Gundry & Welsch (2001) found that high-growth oriented entrepreneurs were significantly more likely to pursue market expansion, technological change, search for financing, emphasis on team-based structures, operations planning and organizational development. Furthermore, Litunnen & Virtanen (2009) show that dynamic variables such as production capacity, external relationships/networks and specialized product policy are factors those differentiate growing businesses from non-growing firms. In addition, Baum et al. (2001) note that focus and low-cost strategies related negatively to venture growth in the woodworking industry.

Considering the different arguments on growth determinants, Dobbs & Hamilton (2007) have conducted a study which reviews empirical contributions to the small business growth literatures since the mid-1990s. Based on 34 studies across business sectors, they used four main categories to explain small business growth: management strategies, characteristics of entrepreneurship, environmental/industry specific factors and characteristics of the firm. Table 2-1 summarises the common factors under each category. From the summary, it appears that no single perspective can fully explain growth, thus making high-growth research examination more challenging. Furthermore, there were limited studies of high-growth firms in the Asia Pacific region. Recently Hansen & Hamilton (2011) discovered that high growers in New Zealand are oriented towards a culture of innovation, flexibility, constant adaptability and learning. These findings were similar to those of Hinton & Hamilton (2013). Prior to this, a study was conducted in China by Zhang, Yang & Ma (2008). The researchers found that rapid-growth firms tend to be smaller in size with less than 50 employees, a high percentage of employees hold university degrees, the firms have growth-oriented vision and missions, the emphasis is on day-to-day cooperation from advisors, creating value for customers, product superiority and innovation.

**Table 2-1 Summary of Small Business Growth Evidence**

| Management Strategies | Entrepreneur Characteristics | Environmental/industry specific factors | Characteristics of the firm |
|---|---|---|---|
| • Growth objective<br>• Employee recruitment and development<br>• Product market development<br>• Financial resources<br>• Internationalisation and business collaboration<br>• Flexibility | • Motivation<br>• Education<br>• Experience<br>• Size of the founding team | • Demand variations<br>• Supply variations<br>• Number of competitors<br>• Position and role played by large firms | • Size<br>• Age |

*Source: Summarised from Dobbs & Hamilton (2007)*

From the review of literatures, size, age and business type do not significantly impact the growth of a firm. Although the experience and characteristics of founders or managers do affect a firm's growth, the commitment to growth is a greater determinant. Commitment to growth influences management style, organizational structures, business cultures and the development of growth strategies. The firm's ability to utilise internal resources and capabilities and to craft growth-related strategies to overcome industry constraints and the dynamic changes of competitors appear to be far more significant in ensuring high-growth performance.

### *2.2.2 Sustained High Growth*

Though there were quite a number of studies on growth factors, especially in small business, the study of factors contributing to sustained high growth is limited. Nicholls-Nixon (2005) notes that period of rapid growth are usually short-lived; hence it is important to identify management practices that build on the concept of self-organisation to help firms handle unpredictable change in a fast-growing environment. Barringer et al. (2005) have a similar view about short lived growth. They carried out a quantitative content analysis of narrative descriptions of 50 rapid-growth firms and a comparison group of 50 slow-growth firms. The purpose of the study was to draw distinctions in the key attributes between rapid-growth and slow-growth firms. From the study, a conceptual model that summarized the results was developed as Figure 2.1. The study implies that a firm's growth-related attributes, listed in Figure 2.1, make a difference in terms of its ability to achieve rapid growth. The four main dimensions

that determine sustained rapid growth are: founder's characteristics, business practices, attributes in relation to growth and human resources management practices.

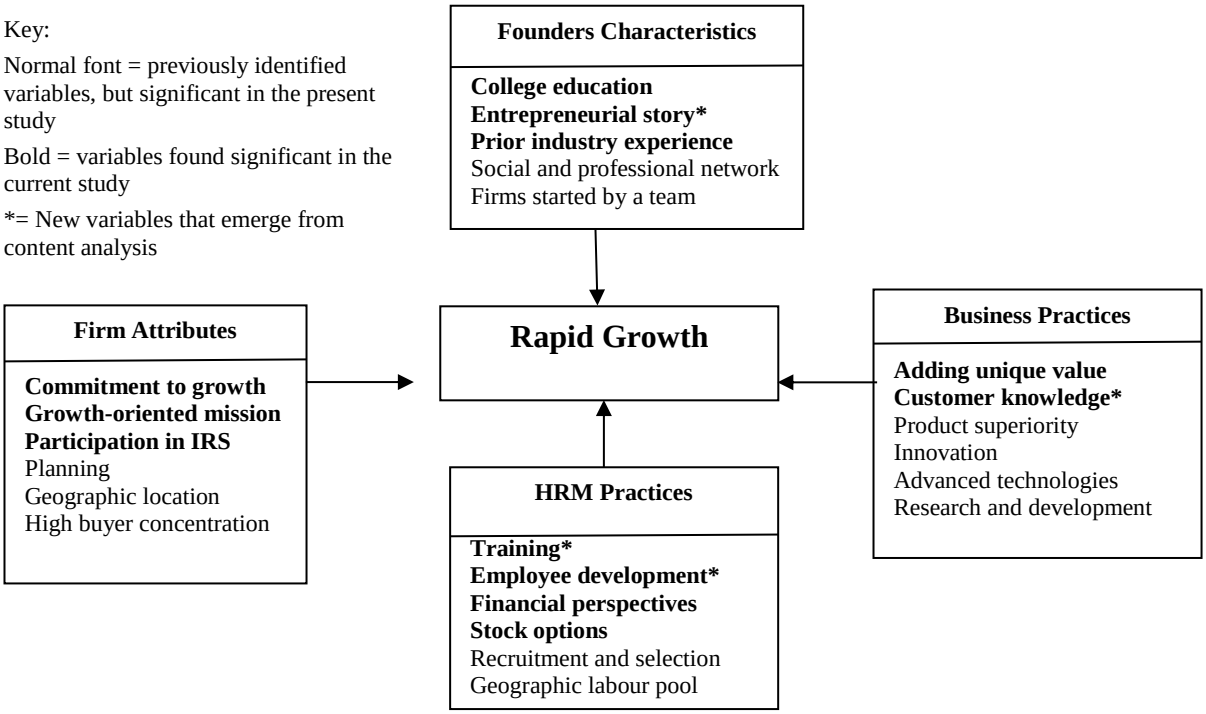



**Figure 2.1 Key Attributes that Differentiate Rapid-Growth Firms from Slow-Growth Firms** *(Source: Barringer et al. 2005, page 683)*

In addition, O'Gorman (2001) conducted a longitudinal study on two retail stores in Ireland to explore factors contributing to their growth. The study suggests that managerial decisions on 'where to compete' and 'how to compete' contribute to sustained growth. The basis of growth is found to be critical if the business is to achieve sustained growth. A period of high growth can contribute resources which can be used to maintain and sustain the growth process. Mascarenhas, Kumaraswamy, Day & Baveja (2002) conducted a similar study by analysing 45 rapidly growing, profitable firms in different industries in the United States. The study revealed five commonly used growth strategies: product proliferation, mass market development, increased value to select customers, distribution innovation, acquisition and consolidation. The selected firms were found to sustain profitable growth over three years. This study suggests that high-growth occurs when firms exploit market disequilibrium to their advantage. Disequilibrium can be caused by rapid changes in technology, products,

expectations, and managerial assumptions. Therefore, it is important to recognise disequilibrium in the market and craft strategy for profitable growth. The five growth strategies identified were found to have multiple reinforcing sources of advantage listed in Table 2-2.

**Table 2-2 Sources Of Advantage for the Five Growth Strategies**

| **Strategy** | **Source of advantage** | | |
|---|---|---|---|
| | ***Scale*** | ***Scope*** | ***Time-based*** |
| *Product proliferation* | Low unit production and distribution costs, global demand | Consistency and umbrella brand across products<br>Cross-selling products and markets | Early domination of product category, quick product development and diffusion |
| *Mass market development* | Reconfigure product to have mass market demand | Broaden geographic scope<br>Outsource functions to reduce costs and increase capacity | Develop policies that travel<br>Use alliances to hasten international expansion |
| *Increasing value to select customers* | | Reduce geographic and customer scope<br>Adjust product scope to increase customer value | Seize early the opportunity revealed by challenging industry norms |
| *Distribution innovation* | Reduce transaction costs with infrastructure investment<br>Use geographical expansion to gain volume | Focus on underserved market segments<br>Invest in new distribution technologies | Exploit distribution innovation before incumbents can react |
| *Acquisition and consolidation* | Capture economies of scale in various functions enabled with larger size after acquisition<br>Develop relationships with larger buyers and suppliers | Reorient acquisition towards growth market segments<br>Re-evaluate outsourcing decisions in all functions after acquisitions<br>Cross-sell products and markets across acquisitions<br>Invest in new technologies that help to manage larger firm | Pursue acquisition early to obtain choice candidates<br>Start integration process early to hasten returns from acquisitions |

*Source: Mascarenhas, Kumaraswamy, Day & Baveja (2002), page 328.*

Krogh & Cusumano (2001) commented that managers cannot leave growth to chance. In order to have sustained high growth, it is critical to integrate growth strategy, knowledge management, capabilities and organizational learning. They suggest three strategies to manage high growth: scaling, duplicating and granulating. Scaling is the first stage of building a new high-growth firm and requires the firm to do more than what the firm is good at. Duplicating is the second stage where the firm repeats the successful business model in new regions. As there are limits to scaling and

duplicating, the final stage is granulating, that is distinguishing cells of the business and growing them aggressively. Table 2-3 summarises the three strategies and their applications to learning and knowledge. The researchers use examples from Netscape, IKEA and SAP to explain the applications of each strategy.

**Table 2-3 Strategies for Growing and Learning**

| **Means of learning** | **Scaling**<br>**Netscape** | **Duplicating**<br>**IKEA** | **Granulating**<br>**SAP** |
|---|---|---|---|
| **Experience sharing** | Sharing the core business knowledge | Sharing the know-how of selecting entrepreneurs and managers | Sharing entrepreneurial knowledge in new business cells for new markets |
| **Externalization: Making experience explicit** | Making entrepreneurial know-how in product development, manufacturing, marketing and sales explicit | Black-boxing entrepreneurial know-how and applying it across new markets | Making the knowledge of entrepreneurs in new cells explicit |
| **Formal sharing of knowledge** | Sharing within and between functions, such as product development or marketing | Sharing knowledge about procedures that work and those that don't work | Building on and recombining explicit knowledge across cells in order to enhance creativity and generate new business |
| **Devoted practice: Learning by doing** | Developing different routines, practices, functions and disciplines | Applying black-box procedures and knowledge | Devoting attention to the evaluation and monitoring of new business opportunities |
| **External knowledge acquisition** | Establishing formal market connections to ensure customer feedback to product development | Acquiring knowledge about the appropriateness of products, services and processes in the local context | Developing procedures for industry learning |

*Source: Krogh & Cusumano (2001), page 60.*

On the other hand, Storey (2011) proposes the optimism and chance (OC) theory to explain why few firms grow continuously. He argues that some of the growth determinants found in previous research, such as human capital, entrepreneurial learning, prior experience, growth attitudes and networks, should be enhanced along the growth stages and thus should demonstrate sustained-growth performance. However, many firms experience an 'erratic one-shot' stage where high-growth performance happens only over one period of time. In evaluating the growth paths of 6247 UK start-ups, Coad & Holzl (2012) also point to the strong role of chance. Hamilton (2011) proposes that the growth of firms is discontinuous, especially when the business failed to exploit growth opportunities. Previously Davidsson et al. (2009) have pointed out

that profitability affects the ability of high-growth firm to sustain growth performance. A high-growth firm that fails to secure substantial profitability will not be able to fund the next phase of growth, compared to a profitable low-growth firm which might find such funding easier. This confirms the findings of Hoy, McDougall & D'Souza (1992) that high growth may be minimally or even negatively associated with firm profitability.

From the above discussion on growth theory, high-growth firms and sustained high-growth literatures, the study of high-growth firms is a path-dependent phenomenon that involves many underlying reasons based on the particular context. There is not much research to distinguish sustained high-growth firms. Storey's OC theory has yet to provide empirical support to explain why growth stalled in the performing firms. As stated in OECD (2010, page 9):

> *High growth represents a transitory phase in the life of an enterprise. High growth is an exceptional event that can occur in the life of virtually any enterprise. It is not a characteristic of a specific subset of firms but a state, normally temporary of a firm. It is the results of a mix of factors and it is normally not to be ascribed only to one reason.*

Thus, a contextual study is required to extend the knowledge of business growth and to identify the mix of factors associated with high-growth performance, whether sustained or not.

### *2.2.3 Growth Measurement and Pattern*

Prior to conducting a study on business growth, it is important to examine the growth measures and patterns proposed in the literature. Currently there is no single way of measuring growth as not all firms grow in the same way. Researchers use different growth measures such as sales, assets, employment, market share, physical output and profits (Delmar, Davidsson & Gartner 2003; Hynes 2010; Hamilton 2011; Barkham, Fagg & Stone 1996; Garnsey, Stam & Heffenan. 2006). Delmar et al. (2003) conducted a study that covered all firms in Sweden with more than 20 employees in 1996, and traced their development back to 1987. Based on this 10-year growth pattern, the study identified seven different types of growth. This study concludes that high-growth firms do not all grow in same way and thus researchers should measure different forms of

growth with different growth measures. A descriptive summary of the seven growth patterns is displayed in Table 2-4. Prior to this study, Murphy, Trailer & Hill (1996) reviewed 51 empirical studies from 1987-1993 that looked at business performance as a dependent variable. It was found that business growth was highly related to performance. Some of the measures of growth noted were: sales, employees, market share, net income margin, CEO compensation, and labour expense to revenue ratios. This finding is consistent with the findings of Chandler & Hanks (1993). Based on a survey conducted in north western Pennsylvania, growth and business volumes were the most common ways to measure new venture performance. The growth and business volume measures had sufficient internal consistency and content validity compared to other measurements such as satisfaction with performance.

**Table 2-4 Summary Descriptive Of the Seven Growth Pattern**

| Cluster | Name | Growth pattern | Demographic characteristic |
|---|---|---|---|
| 1 | Super absolute growers | Exhibited high absolute growth both in sales and employment. | Dominated by small and medium sized firms. Found in knowledge intensive manufacturing industries. |
| 2 | Steady sales growers | Rapid growth in sales and negative development in employment. | Almost totally dominated by large firms. Found in traditional industries such as pulp, steel and other manufacturing. |
| 3 | Acquisition growers | Resemble Cluster 1 but have negative organic employment. Growth is achieved by acquiring other firms. | Large firms are over represented. Dominated by older firms (i.e. firms created before 1987). Found in traditional industries such as pulp, steel and manufacturing. Dominated by firms affiliated with firm groups. |
| 4 | Super relative growers | Have a very strong but somewhat erratic development of both sales and employment. | Dominated by small and medium sized firms. 71% of the firms were created during the period of observation. Founding knowledge intensive service industries. A high representation of independent firms. |
| 5 | Erratic one-shot growers | Have on average negative size development, with the exception of one single very strong growth year. | Dominated by small and medium sized firms. Found in low-technology service industries. |
| 6 | Employment growers | Growth is relatively stronger in employment than in growth. | Same as cluster 5 |
| 7 | Steady overall growers | Resembles Cluster 1, but has weaker development. | Larger firms are over-represented. Found in manufacturing industries. Dominated by firms affiliated with larger groups. |

*Source: Delmar et al. (2003), page 210*

However, Janssen (2009) argues that growth cannot be measured through composite indicators, such as mixing different variables like sales or workforce, because they do

not measure the same phenomenon. In his study he found that factors influencing employment growth were largely different from those influencing sales growth. Hence it is important for researchers to justify the choice of a particular growth indicator. This study emphasises the significance of growth conceptualisation to avoid wrong interpretation of results in growth studies and literatures. Nevertheless, Chandler, McKelvie & Davidsson (2009) conducted a study to understand how emerging firms grow by examining the relationship between sales growth and employment growth. From the longitudinal survey on Swedish new firms, they found that transaction cost influences the decision by new firms to employ additional staff as they experience sales growth. The transaction cost effects, which include asset specificity, behavioural uncertainty and influence of resource munificence, moderate the relationship between sales and employment growth. The results showed that new firms with sales growth would not necessary add new staff to manage the growth, but would consider the transaction costs involved, especially in situations where resources are constrained.

The extensive literatures focused on growth as 'change in amount' indicate an imbalance in research initiatives in growth literatures (Leith, Hill & Neergaard 2010). Following Penrose's (1959) *The Theory of the Growth of the Firm*, growth was defined as 'internal process of development' and 'increase in amount'. As there are not many studies capturing growth as a process, McKelvie & Wiklund (2010) suggest more empirical studies looking at growth mode instead of growth rate. They further challenge the limitations on current growth literatures that emphasise growth only as an input and output in the growing stages of a firm. This paper shows a vast gap in the literature in understanding how firms grow and interpreting growth as a process. Selecting the right measure of growth is critically important in identifying and correctly defining high-growth firms. Hoy et al. (1992) argue that sales growth is the best growth measure and this is widely noted by authors such as Barkham et al (1996), Davidsson & Wiklund (2006) and Covin, Green & Slevin (2006). In addition, sales and turnover growth were often found to be the goal of business owners (Dobbs & Hamilton 2007; Mason & Brown 2010). Davidsson, Achtenhagen & Naldi (2005) emphasise that theoretical and industry-specific concerns should determine the choice of indicator(s). The OECD (2007, 2011) has defined high-growth firm as 'enterprises with average annualised growth in turnover greater than 20% per annum, over a three year period and with more than 10 employees in the beginning of the observation period', and this

is deemed to be the most appropriate measures in the current study context. This definition includes the input (employees) and output (sales) measures in defining the high-growth firm. Furthermore, these measures have been theoretically tested in many of the studies discussed above. The definition is also consistent with Deloitte's criterion of Technology Fast 500 ranking outlined in Chapter 1.

### 2.3 Technology Industry and High Growth

The performance of technology-based firms has been the subject of many research studies since the boom of personal computers. Though many researchers (Acs et al. 2008; Henrekson & Johansson 2010; Mason & Brown 2010) have argued that high-growth firms are not over-represented by high technology industry, there is evidence that high-growth firms are often engaged in innovation activities (Mason et al. 2009). Due to the nature of the technology industry, which is highly competitive with a fast rate of change, technology-based firms rely heavily on their ability to innovate (Huang 2011). There is extensive government assistance in this industry to support and nurture business growth (Löfsten & Lindelöf 2002; Dodgson et al. 2008; Ramasamy, Chakrabarty & Cheah 2004). It can be seen in Table 1-1 in Section 1.5 that many governments in the Asia Pacific have consistently supported the industry. Nevertheless, although high-growth firms are found in all industries it can be argued that technology-based firms involved in research and development initiatives are more likely to experience high-growth performance.

In the early 90s, a study was conducted by Fesser & Willard (1990) comparing the founding strategies of high-growth and low-growth technology-based firms in the United States. The study found that high-growth technology-based firms were more likely to have products/markets/technologies closely related to those of their founders' incubator organizations. Besides, these high-growth firms are more likely to be started by larger teams, to have a more stable product/market focus and to derive a significant percentage of revenues from international sales. The study also noted that high-growth technology-based firms have made a better job of deciding what to produce/offer and which market to enter. Competitive strategies and related experiences of the founders were found to be main contributors to a firm's growth. Findings from this study are similar to those of their earlier study (Fesser & Willard 1989) which found that

founders from high-growth technology-based firms tend to come from large, publicly-held profit-seeking organizations. These founders often start new ventures closely related to those of their incubators. As such, company-specific and founder-specific characteristics imply strong correlations with growth rate among technology-based firms (Almus & Nerlinger, 1999)

Eisenhardt & Schoonhoven (1990) also explored organizational growth in technology-based ventures. From their study of 102 firms, the majority from Silicon Valley, technology-based firms founded in growth-stage markets are more likely to become large than those founded in emergent or mature markets. It seems that the resource opportunities of growth markets give young firms a substantial advantage. The size of the top management team and prior industry experiences also linked to high growth in these newly-founded United States semiconductor firms. This finding is similar to Siegel et al. (1993). However, Eisenhard & Schoonhoven (1990) note that technical innovation strategy and marketplace competition were not significant to organizational growth.

Pavia (1991) conducted an empirical analysis of 118 high-tech manufacturers and software developers. His study shows that small firms with formalised systems made better choices regarding new products development. McCann (1991) conducted a study on 100 CEOs from young technology-based firms in eighteen county regions of a south-eastern state in the United States. From his study, high-performing young ventures were found to pursue internal innovation through research and development to achieve product breakthroughs. In related to growth strategies, these CEOs preferred joint ventures and alliances to gain access to distribution channels and new markets. Most of their decision-making was based on advice from senior managers and board members. Besides, Cooney (2009) notes that high-growth firms in the technology industry started off with organic structure and emergent strategy. Based on his comparative study between United States and Ireland, it is interesting to note that strategy changed as the firms grew older. American software firms moved towards a combination of organic structure and deliberate strategy, whereas Irish software firms became more mechanically structured and deliberate in their strategies. It seems that cultural and market environments have some effects on the structures of technology-based firms.

Another study on growth strategies and the barriers faced by new technology-based SMEs was conducted by Keogh & Evans (1999). The study revealed that the success of these technology-based firms was due to maximizing niche opportunities, leadership vision and the drive for growth. Based on the interviews with 20 new technology based firms in the Aberdeen area of Scotland, the study found that senior management recognised the need to plan strategically. Elements in the strategic planning process include: innovation, internationalisation, internal and external communication, collaboration, entrepreneurial activity and quality. However, not getting the right people and not having access to good finance and market conditions were barriers that hindered their growth. Acquisition can be considered as one growth strategy preferred by technology ventures (McCann 1991). Through this strategy firms can gain access to new technology capabilities and new market and distribution channels. Graebner (2004) studied the way mergers and acquisitions create value for acquired technology-based firms. This study found that the acquired firm can obtain expected and serendipitous (non-anticipated) value if the acquired managers know how to realise the potentials of integration. It is important that acquired managers help to limit negative emotions and turnover by engaging in mitigating actions that address employees' problems and concerns throughout the acquisitions process.

Innovation is an important element or capability for technology-based firms. Without innovative behaviour and efforts, technology-based firms struggle to compete in the dynamic marketplace. The fastest emerging markets such as China also require heavy involvement in research and development. A study by Chen & Yuan (2007) found that the majority of Chinese high-tech firms are small medium enterprises, hence their major innovation strategy is outsourcing, especially technology imports. The empirical analysis indicates the insufficiency of internal research development expenses and the weak absorptive capacity in Chinese high-tech firms. Absorptive capacity is a set of organizational routines and processes that firms use to acquire, assimilate, transform and exploit knowledge (Zahra & George, 2002). These findings suggest a reform of the innovation service system in China. As part of innovation initiatives, cooperation and linkages between firms have a strong impact on growth and performance. Mohannak (2007) conducted a study examining the innovation networks of high-technology small and medium firms in Melbourne, Australia. According to Mohannak, SMEs are better able to innovate and learn when they are part of cooperative networks. Through the

networking process, SMEs develop new skills, knowledge, abilities, products, processes and services. The study found that most of the information communication technology-based firms have extensive innovation networks with customers, suppliers, consultant and foreign partners. Through these networks, the firms managed to improve their innovative capability. Collaboration with universities and training institutions in the closer vicinity did occur, however the technology-based firms tend to make use of locally-trained skilled staff in their business and to focus on innovative activities rather than rely on other forms of collaboration. Besides innovation, knowledge is another key determinant of a firm's growth. Saarenketo, Puumalainen, Kuivalainen & Kylaheiko (2009) conducted an empirical analysis of 171 information communication technology new ventures in Finland. This study used six determinants of knowledge: appropriability, threat of opportunism, asset specificity, and economics of scope and economics of scale to predict new venture growth. The findings note that economies of scale and scope proved to be a key for growth. Hence, knowledge about resources, markets and customer segments are important for new venture growth.

The reviews above suggested that the growth of technology-based firms is influenced by their product and market selection, capabilities derived from external and internal resources, selection of strategies, and growth constraints. Though no study has examined the possibilities of technology-based firms becoming high-growth firms, there is a close relationship between high-growth and technology-based firms based on industry characteristics. This industry faces a more challenging industry structure, environment and nature. It has a low entry barrier, high dependence on resources that are easily mobilised and a fast pace of change due to the advancement of global technology (Eisenhardt & Sull 2001). Hence, technology-based firms that have achieved high-growth performance could be considered extraordinary performers, more so if the firms have achieved high-growth performance for a period of time. In addition, Tuck & Hamilton (1993) also note that despite the extensive studies on business growth, researchers are still unsure why some firms grow and others do not when they originate in similar circumstances, By focusing on the growth of firms in the technology industry using similar dimensions, this thesis intends to provide a better explanation and differentiate the high-growth technology-based firms.

## 2.4 Growth Dimensions

From the discussion in the previous sections, three dimensions have strong influence in building high-growth technology-based firms. Firstly, resources and capabilities which are governed by the resource-based theory form the foundation of growth. The resources come from both internal and external environments. This dimension also extends to effectiveness of strategy implementation, which is often labelled as dynamic capability. The second dimension is the growth oriented strategies that have successfully orchestrated the first dimension. Finally, the growth challenges which include the external environment effect and barriers are often considered to affect the growth outcome. Characteristics such as the size and age of a firm are not included because of the contradictory research outcomes discussed earlier.

### *2.4.1 Resources, Capabilities and Dynamic Capabilities*

Resources and Capabilities

As discussed in resource-based theory, resources that are found to fulfil VRIN criteria can help to develop a firm's competitive advantages and eventually provide extraordinary growth. On the other hand, lack of resources and problems in organising resources can be a major growth setback for growing new firms (Garnsey & Heffernan 2005). This shows the importance of resources to high-growing firms. These resources come in the form of human capital (Alvarez & Busenitz 2001; Hambrick & Crozier 1985; Barringer et al. 2005), financial (Siegel et al. 1993; Wiklund & Shepherd 2003), knowledge and learning (Von & Cusumano 2001; Conner & Prahald 1996), tangible and intangible resources (Fernandez, Montes & Vázquez 2000; Galbreath 2005). Extensive research has been conducted to search for the types of resources required to achieve sustainable competitive advantage, yet limited studies were conducted on the sources of resources. Barney & Clark (2007) initiated a call to expand the resource-based theory by understanding the sources of these important resources so that a firm will be able to plan for sustained growth

Generally, firms accumulate resources from both the internal and external environment. The most important sources from the internal environment are the owner-manager or the entrepreneur (Daily & Johnson 1997; Baum et al. 2001; Hansen & Hamilton 2011) and the human capital resources (Beckher & Gerhart 1996; Zhang et al. 2008) found in the firm. Many studies discussed in Section 2.2.1 have confirmed the influence of these

human resources in growth performance. Some of the resources contributed by the owner-manager or entrepreneur include industry prior knowledge, entrepreneurial orientation, financial and intellectual capital. This group of leaders together with the workers provide knowledge, a source for identifying opportunities, and crafted strategies to navigate firm's growth performance. Thus extensive work is conducted to improve human resources for higher growth performance (Guest 1997; Barney & Wright 1997; Barringer et al. 2005; Bowen & Ostroff 2004; Mason, Robinson & Bondibene 2012).

Reviews of the external environment and stakeholders involved in a firm reveal two channels that contribute to growth by providing the necessary resources. They are government support and external relationships/networks. Researchers have proven the value of government support to high-growth firms in the form of financial resources (Afcha 2011); advice (Fischer & Reuber 2004); facilitation of external relationship/collaborations (Patzelt & Shepherd 2009); and infrastructure decisions (McCann 2009). All of these supports have directly or indirectly provided resources to develop innovation capability, internationalisation initiatives, staff training and development (Koski & Pajarinen 2011; Revesz & Lattimore 2001; Czarnitzki 2006; Bonner & McGuiness 2007). Though there were diverse views on whether governments should provide business assistance to firms in particular categories (Greene 2012; Mason & Brown 2011); it is undeniable that governments have a critical role to play in nurturing high-growth firms. However there is no generic evidence of what government policies provide best support to the high-growth firms. There are ranges of governmental policies that are found to be more or less effective in different countries (MacDonald 1986; Hu 2007; Chaminade & Vang 2008; Nishumura & Okamuro 2011).Thus; it is appropriate to investigate governmental approaches towards high-growth firms in the context of each country.

Firms build external relationships/networks with their customers, business partners, industry player, suppliers as well as competitors. Some of these relationships are proven to be useful in promoting growth, and are considered to be sources of growth resources. For example, studies conducted in Sri Lanka (Premaratne 2001), China and Singapore (Zhang, Soh & Wong 2011), found that external relationships/networks were helpful in finding new sources of resources. A study on the Malaysia information

communication technology sector conducted by Omar & Rejab (2011) found that this group of firms relied heavily on stakeholder networking. Entrepreneurs were seriously engaged in multiple network relationships, especially among the high performers. In addition, networks also provide channels for firms to get latest information about the industry and market (Butler, Brown & Chamornmarn 2003), creating business value (Holm, Eriksson & Johanson 1999); facilitating knowledge transfer and learning (Dyer & Hatch 2006; Lowik, Rossum, Kraaijenbrink & Groen 2012); building innovation capability (Lau, Yiu, Yeung & Lu 2008; Mahmood, Zhu & Zajac 2011; Gronum, Verreynne & Kastelle 2012) and developing products and market expansion (Falemo 1998; Coviellio & Munro 1997; Chetty & Holm 2000). Lechner & Dowling (2003) studied network relationships of high-growth entrepreneurial firms in the IT industry. They discovered that firms used networks for a variety of purposes that changed with the development of the firms. Prior to this, Zhao & Aram (1995) also found that managers of high-growth firms reported a greater range and intensity of business networking than did managers in low-growth firms. Similarly, the relationship between networking activities and growth transcended the development stage. These previous studies have demonstrated the importance of external relationships/networks as a source that offers critical resources for growth at different stages. Furthermore, Robson & Bennett (2000) also revealed that obtaining external advice in fields such as business strategy and staff recruitment is associated positively with high performance. In addition, mutual arrangements with suppliers have a strong positive relationship with employment and turnover growth.

There may be many available resources within a firm that do not transform into competitive advantage. This relates to the ability of the firm to orchestrate those resources in the most efficient and effective way, in other words to the capability of the firm. According to Amit & Schoemaker (1993), these are "information-based processes that are firm-specific and developed over time through complex interactions among the firm's resources". Chandler & Hanks (1994a) comment that it is difficult to differentiate existing resources and the capability to employ those resources from the measurement perspective. Thus, they have developed the concept of resources-based capabilities. Their study shows a positive relationship between resources-based capabilities and a firm's growth. Similarly, Barney & Clark (2007) consider capabilities as the close conceptual cousin of resources. Using a similar concept, this thesis

examines resources-based capabilities from a functional perspective. This is considered to be a relevant and widely-accepted way of evaluating their impacts on strategies and business growth (Amit & Schoemaker 1993; Barbero et al. 2011).

Carmeli & Tishler (2004) comment that resources and capabilities are industry-specific and cannot be transferred across industry boundaries. As such, it is important to identify the major resource-based capabilities relevant to the technology industry which is the focus of this study. Technology-based business is often associated with providing innovative products and services, therefore research/innovation capability is deemed to be very important (Coad & Rao 2008; Gracia-Majon & Romero-Merino 2012; Lee et al. 2001). According to Mone, McKinley & Barker (1998), innovation capability is the most important determinant of a firm's performance. Wang & Chang (2005) and Hsu & Wang (2012) also have confirmed the link between intellectual capital and performance in Taiwan's high-tech industry. Several researchers (Romijn & Albaladejo 2002; Afcha 2012; Holzl 2009; Guan & Ma 2003) also show the significance of research and development activities in promoting innovation capability and business growth. Intellectual property (Pisano 2006) and learning by doing through product development (Cavusgil, Calantone & Zhao 2003; McCann 1991) were also considered to assist in developing the research/innovation capability of a firm.

Keogh & Evans (1999) have identified three major barriers faced by technology-based SMEs: lack of human capital, access to finance and market conditions. Therefore, it is critical that technology-based firms build related capabilities to overcome these growth barriers. Chien & Chen (2008) suggest that human capability is vital in order for high-tech firms to maintain competitive advantages in the knowledge-driven industry. Furthermore, it has been proven by Colombo & Grill (2005); McPherson (1996) and Fesser & Willard (1990) that a founder's human capital affects the growth of a technology-based firm. Deeds, DeCarolis & Coombs (2000) also comment that capabilities are embedded in the firm's knowledge base and in high technology industries. High technology-based firms cannot depend solely on internal knowledge development; absorptive capacity to gain relevant knowledge from external sources is critical. This empirical analysis, which involved 94 pharmaceutical biotechnology-based firms in United States, finds that geographic location, the quality of the scientific team and having a CEO with experience in managing product development have

significant impact on new product development. This research demonstrates that human capability is very important. As technology industry is innovation, knowledge-driven and often service-orientated, it is not surprising that the capabilities of human resources in the firm will determine its growth performance.

Financial capability is also considered to be important for technology-based firms. Based on research conducted with a group of Korean technological start-up firms, Lee et al. (2001) highlighted the importance of financial resources in affecting the start-up's performance. This is also proven by Florin, Lubatkin & Schulze (2003); McMahon & Davies (1994) and Mendelson (2000). Technology-based firms require a large investment in product development and market expansion to compete in the fast changing market. In addition, Markman & Gartner (2002) stated that sales growth and profitability are non-correlated. This means that high-growth technology-based firms face tougher challenges in funding their growth, and therefore their ability to manage cash flow and cost control is critical. In addition, financial independence is important to this industry (Omar & Rejab 2011).

Many technology-based firms have generated business growth by expanding their markets domestically and internationally (Coviello & Munro 1995; Burgel & Murray 2000). Hence it is important for technology-based firms to have great understanding of their markets and be able to combine the required resources to exploit new growth opportunities (Omar & Rejab 2011). Gruber, Heinemann, Brettel & Hungeling (2010) used the data obtained from 230 technology ventures to show that sales and distribution capabilities affected the sales and distribution performance of a firm, thus affecting its overall performance. In other related studies on high-growth firms, marketing capabilitiy which include the search of new growth opportunities, product improvement and adequate marketing strategy were found to be of importance (Wiklund & Shepherd 2005; Baum et al. 2001; Chandler & Hanks 1994b; McCalister 2012). On the other hand, Grant (1996) proposed that operating in unstable market conditions caused a firm to be more innovative, and increasing intensity and diversity of competition have led to greater dependence on its organizational capabilities in establishing long-term strategies. As defined by Knight & Cavusgil (2004), organisational capability reflects the ability of a firm to perform repeatedly productive tasks that create value by transforming inputs into outputs. Though there is limited research on the importance of

organisational capability in the technology industry, it is suggested this aspect provides structure, culture and strategic planning in managing business performance (Miller & Cardinal 1994; Gordon & DiTomaso 1992; Lewis & Churchill 1998). In addition, Man, Lau & Chan (2002) have developed a model of SME competitiveness based on an extensive review of literature. The model consists of four constructs: competitive scope, organisational capability, entrepreneurial competencies and a firm's performance. They hypothesise that organisational capability has a direct influence on the firm's performance. Nevertheless, the model has yet to provide any empirical evidence.

Dynamic Capabilities

Besides the resources-based capabilities derived from resource-based theory, similar concept that extends from the theory is that of dynamic capabilities. Before 1990s, studies of how firms build competitive advantage were mostly evolved around the resource-based view. This theory proposed that firms with valuable, rare, inimitable and non-substitutable resources/capabilities can achieve sustainable competitive advantages. This VRIN framework could not explain how firms in highly dynamic markets achieved sustainable competitive advantage. Hence Teece, Pisano & Shuen (1997) have identified a critical ingredient: dynamic capabilities to enhance the resource-based view. Dynamic capabilities are complex, higher-order organizational processes which provide adequate conditions for the modification and renewal of the firm's stock of business assets (Lopez 2005). Similarly, Helfat, Finkelstein, Mitchell, Peteraff, Singh, Teece & Winter (2007) viewed dynamic capability as the capacity of an organization to purposefully create, extend or modify its resources base. This implies that dynamic capabilities can be firm-specific and paths independent. Dynamic capabilities are an important strategic tool to help a firm's formulates strategy, especially when paying attention to aspects of knowledge and ability which generate the firm's core competence. However, Eisenhardt & Martin (2000) argue that dynamic capabilities are not likely to be sources of sustainable competitive advantage. They observe that dynamic capabilities are more homogeneous, fungible and substitutable. Firms can gain the same capabilities from many paths and independent of other firms. Dynamic capabilities are a set of specific and identifiable processes such as product development, strategic decision making and alliances. Hence dynamic capabilities can be a source of competitive advantage, without being sustainable. Firms have to

continuously reconfigure resources by using dynamic capabilities, and thus they can be considered as process-based capabilities.

High technology-based firms are exposed to changes internally or externally every day. The mobility of resources such as high staff turnover can affect their capacity to create and develop dynamic capabilities. Bowman & Ambrosini (2003) argue that dynamic capabilities comprise four main processes: reconfiguration, leveraging, learning and integration. These organizational processes can change the firm's resource base. Reconfiguration refers to the transformation and recombination of assets and resources. Leveraging is replicating a process or system from one business to another. Learning allows work to be conducted more effectively and efficiently by reflecting on experiences. Integration involves a firm's ability to integrate its assets and resources to a new resource configuration. This framework has important implications for dynamic capabilities research. First of all, firm's abilities to create, extend and modify its resource base do not necessarily lead to competitive advantage (Helfat et al. 2007). These changes may not be valuable to the market. This leads to the second implication, that environment has a moderating effect on the firm's performance in the market. Finally, the elements of internal environment seem to play an important role in influencing dynamic capabilities processes. However, empirical evidence to support both these frameworks developed from dynamic capabilities is still lacking.

Recent empirical study conducted by Macher and Mowery (2009) examines one type of dynamic capability: the development and introduction of new process technologies in semiconductor manufacturing. This study involved qualitative and quantitative methods and covered 32 semiconductor firms at different locations, including United States, Europe, Japan, Korea and Taiwan, from 1989 to 2001. Zollo & Winter's (2002) theory of deliberate learning mechanism in building dynamic capabilities was emphasized in this study. Hence knowledge articulation and knowledge codification in process development were measured. The findings showed that research and development organisation and information technology build problem solving abilities and shape the new process development and introduction capabilities of semiconductor manufacturers. They helped to improve the abilities of these organisations to utilise production-based information and to learn. The empirical results provide strong support for Teece et al. (1997), Eisenhardt & Martin (2000), Zollo & Winter (2002) and Helfat

et al. (2007). Furthermore, the study proved that deliberate learning is important for the development of dynamic capabilities.

Dynamic competitive capability is derived from the learning mechanism that emphasises routine, highly patterned behaviour (Winter 2003). It is defined as a set of stable patterns and activities based on an organisational routine and implemented via learning (Chen & Lee 2009). Based on five case studies (of firms involved in alliances) conducted in Taiwan, they found that external linkages, previous experiences, repeated practice, experience codification and the integration power of managers have a positive impact on dynamic competitive capability development. Zahra, Sapeinza & Davidsson (2006) have a similar view that managers' visions and integration skills make an important difference in the development of capabilities. Entrepreneurial activities are crucial for the conception, development, configuration and maintenance of dynamic capabilities.

Dynamic capabilities can take on multiple roles in organizations, such as changing resource allocations, organizational processes, knowledge development and transfer and decision making (Smith, Lyles & Peteraf 2009). After the information era, growing research in the field of knowledge management indicates that a firm's ability to organise its knowledge management activities has in fact become that firm's competitive advantage. Helfat & Raubitschek (2000) believe that organisations can successfully build and utilise knowledge and capabilities over long time spans, in single and multiple product markets, for continuing competitive advantage. Knowledge is a resource that supports capabilities, activities and products. In addition, growth is not sustainable without the dynamic re-development of knowledge-based resources and capabilities because an organisation that does not undergo this redevelopment is less capable of discovering new opportunities (Saarenketo et al. 2009). In a study by Dalley & Hamilton (2000), it was found that learning helped to create sufficient knowledge and then create critical resources for subsequent business growth. To overcome the problem of resources mobility, it is proposed that another process called knowledge transfer should be included to create dynamic capabilities. According to Von Krough et al. (2000) cited by Rhodes, Hung, Lok, Lien & Wu (2008), knowledge transfer is critical to the performance of knowledge creation and leveraging knowledge for greater organization performance. Previous studies (Hansen, Nohria & Tierney 1999; Inkpen &

Tsang 2005; Rhodes et al. 2008) found that knowledge transfer, through either personalization or codification, is vital in order to develop organization innovation capability and influence organization performance. In addition, Williams (2007) believes that replication and adaptation lead to successful knowledge transfer and thus to improved performance of an organization. His comments are based on his survey of cross-border knowledge transfer relationships among firms in the telecommunication industry. As innovation capability is an important element for technology-based firms, the role of knowledge transfer as a source of dynamic capability requires further study. Furthermore, strategic innovation is considered as higher order change capabilities (Winter 2003).

Based on the dynamic capabilities studies reviewed, there are two important main elements in dynamic capabilities: human capital and knowledge capital. In terms of human capital, entrepreneurial activities and decision-making are key contributors, as are the creativity and innovation of employees. As for knowledge, it is generally derived from deliberate learning and knowledge management efforts in an organisation and from there the organisation can generate strategic innovation that sustains long-term growth (Kim & Mauborgne, 1998). However, there is a lack of empirical evidence to demonstrate the presence of these two elements in dynamic capabilities, which substantially influence the functional capabilities. All of the functional capabilities proposed earlier require continuous human effort and knowledge learning. Further study is required to assess the presence of these elements and confirm that higher order dynamic capabilities exist for long-term growth. Nevertheless, this thesis adopts the view from Barney & Clark (2007), who consider dynamic capabilities as the ability to create capabilities from the resources owned by the firm, by examining whether the high-growing firms have the ability to use resources dynamically to generate useful functional capabilities. Similarly, Wang & Ahmed (2007) consider that dynamic capabilities influence long-term performance through capability development and business strategy as shown in Figure 2.2.

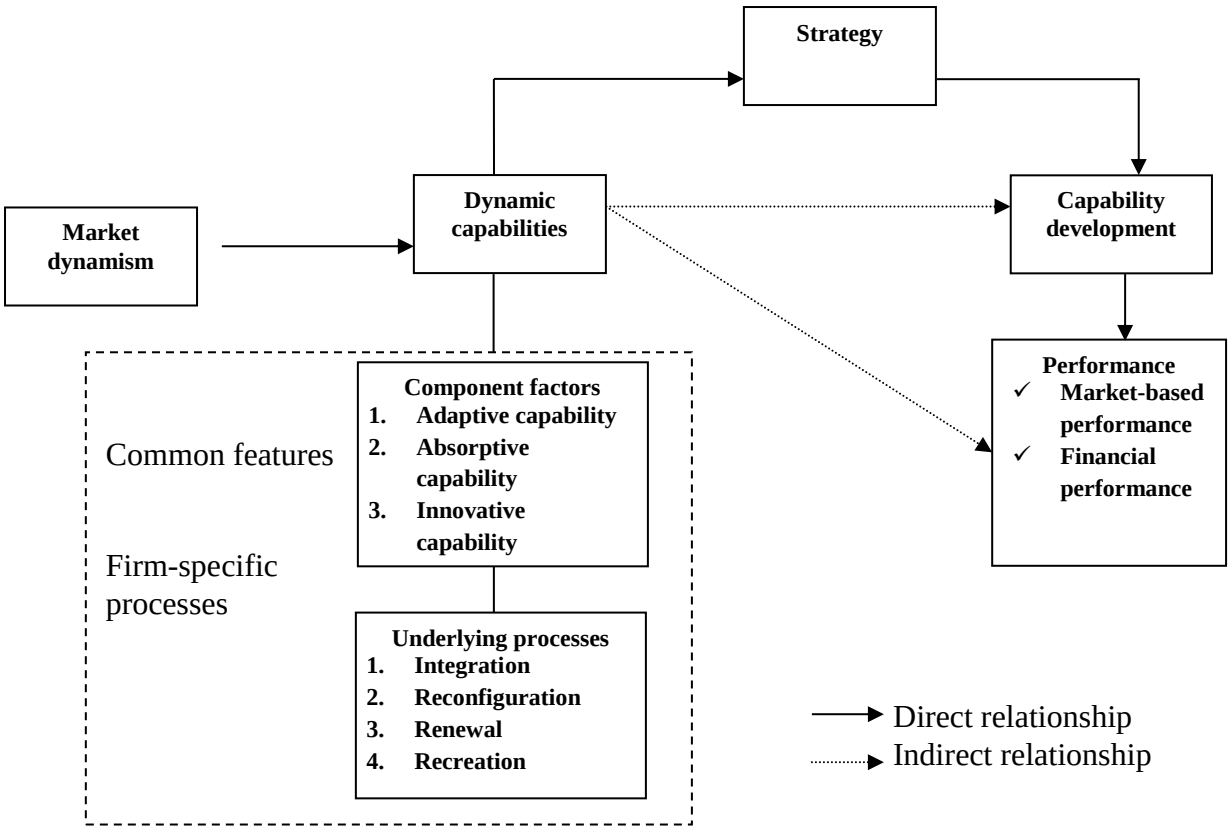



**Figure 2.2 A Research Model of Dynamic Capabilities**

*(Source: Wang & Ahmed 2007, page 39)*

### *2.4.2 Strategies*

Based on the studies mentioned in Section 2.1.2, it is difficult for a firm to sustain high growth in the long term. There have been many efforts to identify the factors affecting growth (Bracker, Keats & Pearson 1988, Ducheseneau and Gartner 1990, McDougall et al. 1994, Reid and Smith 2000, Watson, Steward & Barnir 2003; Hynes 2010). Parker, Storey & Witteloostuijn (2005) developed a theory of dynamic management strategies that highlighted the importance of a firm adjusting its strategies in response to external environmental changes. The study used a novel British data set containing information on over 100 gazelles. These firms were tracked from 1992 to 2001 regarding their status and growth. Empirical results reveal that gazelles have difficulty sustaining their frenzied pace of growth. In the researchers' opinion, management strategy is a more important driver of the growth of gazelles than their external environment. Apart from the resources and capabilities owned by the firm, strategy is often seen as a main determinant of performance (Leitner & Guldenberg 2010; Ortega 2010). Some researchers have emphasised the role of strategy in influencing the relationship between resource-capabilities and performance (Edelman et al. 2005; Wery & Waco 2004;

Chandler & Hanks 1994a). However, the studies of growth strategies were quite fragmented and opinions divided.

Product and market strategies have been discussed frequently. For example, Scott & Bruce (1987) identify key issues that managers must address in pursuit of business growth. They are management style, organizational structure, product and market research, systems and controls, major sources of finance, cash generation, and major investment and product market issues. Siegel et al. (1993) found that relatively young and small high-growth firms are more focused in terms of products and competitive strategy. Mature and larger high-growth firms display a greater propensity for market and product diversification. The study also notes that organisational leanness is significant in high-growth young and small firms but not in mature and larger firms. Similarly, Feeser & Willard (1990) found that the initial market/product focus of high-growth firms tends to be much more stable than that of their low-growth counterparts. Mosakowski (1999) also supports findings that high-performing firms have better-established focus and differentiation strategies than other firms. Another study in Finland provided similar findings. Litunnen & Virtanen (2009) conducted a longitudinal study on 200 SMEs in Finnish metal-based manufacturing and business services since their start-up in 1990. Their results show that dynamic variables such as production capacity, external relationships/networks and specialised product policy are factors that differentiate growing businesses from non-growing ones. However, Baum et al. (2001) discovered that focus and low cost strategies related negatively to venture growth in the woodworking industry. The study also noted that the specific competencies and motivations of CEOs and the competitive strategies of firms were direct predictors of venture growth.

There were some studies of growth in relation to innovation strategy. Kim & Mauborgne (1997) found that innovation in crafting a value based strategy was very important. High growers worked on value innovation logic along the five dimensions of logic: industry assumptions, strategic focus, customers, assets and capabilities, products and service offerings. House (2004) and Slywotzky & Wise (2003) suggest innovation strategy as one of the few ways to enlarge the market size and grow revenues as well as profit. Innovation seems to be another key aspect related to a firm's growth. Roper (1997) examines the relationship between product innovation and growth in small firms

in Germany, Ireland and the United Kingdom. This study found that in all three countries the output of innovative small firms grew significantly more than that of non-innovators. Small firms in U.K. and Ireland demonstrated a more balanced approach, with increases in both employment and productivity associated with innovative behaviour, while Germany experienced increased productivity but reduced employment. Small firms in Germany were found to be more formally organised but less market oriented. This is further supported by Mason et al. (2009) who established that innovative firms in the UK grow faster than their non-innovative counterparts. A similar study was conducted in China by Zhang et al. (2008), who found that rapid-growth firms strive to create value for customers, product superiority and innovation. Furthermore, Bradley, Jeffrey, Artz & Simiyu (2012) note that differentiation-related innovations led to better performing firms. From the product perspective, high-growing firms tend to focus on high-end, innovative product (Upton, Teal & Felan 2001; Freel & Robson 2004; Mason et al. 2012), and this is more obvious in the medium-high technology industry (Smallbone et al. 1995).

Another group of researchers (Coad & Tamvada 2011; Coviello & Munro 1995; Reijonen, Laukkanen, Komppula & Tuominen 2012) found that market diversification, especially exporting and other internationalisation efforts, has a positive effect on growth. As mentioned earlier, Gundry & Welsch (2001) surveyed 832 women business owners in all industrial classifications from Dun's Marketing Database. The result shows distinct differences between high-growth-oriented entrepreneurs and low-growth-oriented entrepreneurs. High-growth-oriented entrepreneurs were significantly more like to pursue market expansion, technological change and search for financing, and to emphasise team-based structures, operations planning and organisational development. This group of entrepreneurs perceived a strong focus on quality products or services, an available cash flow to allow growth, and effective leadership as strategic success factors. In addition, Andersson (2003) points out that growth is a complex phenomenon that has to be viewed from different theoretical angles to be understood. Based on his case studies on three high-growth Swedish firms in the enterprise resource planning industry, he shows that entrepreneurs' intentions, international growth strategies, organic organisations, industry structure and networks and national cultures are factors that influence a firm's growth. The study also notes that there is no causality between profitability and growth. Growth oriented firms in this industry were willing to

sacrifice short-term profitability for growth. Expansion through local and global acquisitions is important in this highly competitive environment. These high-growth firms were found to have active strategies, decentralised decision-making systems and flat structures. This is consistent with what has been suggested by Carman & Langeard (1980) in their search of growth strategies for service firms. In addition, the study conducted by Smallbone et al. (1995) found that almost all of the high-growth firms examined had identified and responded to new market opportunities.

Apart from the growth strategies discussed above, there were a number of strategies used by the technology industry. Some of these strategies may or may not relate to high-growth performance. Among the strategies that were found in technology-related industries were: product diversification and innovation (Stern & Henderson 2004; Barczak 1995); globalisation (Laanti, Gabrielsson & Gabrielsson 2007); technology alliances or cooperative strategies (Stuart 2000); acquisition (Lowe & Taylor 1998; McCann 1991) and niche strategy (Chang & Tsai 2002). It is important to note that the technology industry is often seen as highly influenced by the environment, and therefore different strategies may be used in different countries. In the context of this thesis there has been limited research on this particular industry in Malaysia and New Zealand. Nevertheless, it was found by Soulder, Buisson & Garett (1997) that small entrepreneurial high-technology-based firms in New Zealand had generated success through customer-oriented product innovation strategy. A relevant study in Malaysia was conducted by Omar & Rejab (2011) who found that the innovativeness and technical excellence were among the business orientations derived from technology entrepreneurs. Neither studies relates the research to high-growth aspects, therefore it is important to investigate the strategies used by high-growth technology-based firms in both countries. This could help to provide a more realistic overview of the resource-capabilities required and the strategies used in both countries in relation to high-growth performance.

### *2.4.3 Growth Challenges*

Besides looking at the drivers of growth, there is considerable literature about growth challenges or constraints. The term challenges is used in this thesis because it includes constraints that have negative influence on growth as well as other external factors whose impact on growth has yet to be determined. For example, changes in the external

environment might create new growth opportunities or restrain growth in the current market. Garnsey & Haffernan (2005) suggest that a volatile environment could be a growth setback. However, McDougall et al. (1994) indicate that industry growth rates and strategic breadth could greatly influence new venture performance. This is consistent with Weinzimmer's (2000) proposal that if the firm is in a growing environment, more resources should be allocated to exploiting growth opportunities. Zhang et al. (2008) comment that environment is perceived in rapid-growth firms as dynamic, hostile competition and a heterogeneous market. Stern & Henderson (2004) discovered that the external environment has a great deal of influence on the performance of a firm's diversification strategy. Their study clearly proves the moderating effect of external environment in technology-intensive industry. Nicholls-Nixon (2005) also identifies challenges from the external environment as one of the problems experienced by rapid-growth firms. In addition he found that business model issues such as organisation management structure, financial management and transition of the firm's personnel also affected rapid-growth firms. It is interesting to note that all of these problems are closely related to the human and organisational factors within the firm, which are discussed in earlier paragraphs. Another aspect of the external environment would be industry competition. Gill & Biger (2012) found that tough market competition was one of the strongest barriers to small business growth. The dynamism and intense competition of the industry also differentiated rapid-growth firms from slow-growth firms in China (Zhang et al. 2008). On the other hand, Geroski & Gregg (1997) note the impact of recession on strategy and growth. Because of the differing views on environment impacts on performance, determining whether environment has positive or negative influence on a firm's performance can be complex.

Many high-potential start-ups failed during their first years despite having innovative products, adequate business models and competent entrepreneurs and employees (Helmchen 2009). Ahlstrom, Young, Chan & Bruton (2004) have examined some characteristics of high-technology-based firms in East Asia that may hinder growth. Organisational barriers seem to be prominent in this group. Most of the Overseas Chinese high-technology-based firms are family controlled, with tight control exercised over simple structures. There is no indication of change to allow for higher growth efforts. Most of these firms prefer to maintain their current size and organisational

structure with less outside control. Furthermore, the owners of firms often give instructions to workers and there are very limited opportunities for employees to be involved in decision making so information sharing and learning transfer seldom occur. At the same time, these firms are mostly internally funded and most are reluctant to opt for venture capital or external funding agencies. One of the reasons given was that the Overseas Chinese firms strongly resist the inclusion of outsiders in top management decision-making. There is no emphasis on spending on advertising, branding, research and development. Most of them are not willing to invest in these major growth thrusts, and therefore there could be long term constraints in their growth.

Similarly, Carpenter & Petersen (2002) note that most small firms finance their growth almost exclusively through retained earnings. Based on their statistical analysis of small United States manufacturing firms, they found that such firms were constrained by the availability of internal finance. There is an implication that when firms become larger, older and more informational transparent, their financing options become more attractive (Gregory, Rutherford, Oswald & Gardiner 2005). Hambrick & Crozier (1985) also note that rapid-growth firms are typically cash-starved and have extraordinary resource needs. On the other hand, Sexton, Pricer & Nenide (2000) found that the profitability of a firm correlated with sustainable growth. Firms that could finance internally-generated funding were more profitable than firms with uncontrolled or unbridled growth. This is similar to what has been found by Gill & Biger (2012) in Canada, where small business growth is strongly hindered by lack of financing. As most of the high-growth technology-based firms are started humbly by their founder or founding team, it is highly possible that they face such a barrier. This challenge would disturb their growth performance, as proven by Davidsson, Steffens & Fitzsimmons (2009) in a study conducted in Sweden and Australia. Westhead & Storey (1997) also show that the growth of high-technology small firms is constrained by financial limitations. Nevertheless, Markman & Gartner's (2002) study on Inc. 500 high-growth firms reveals different perspectives on the relationship between growth and profitability. From the data collected from Inc. 500 high-growth firms for 1997, 1998 and 1999, growth in sales and number of employees is unrelated to profitability. However, the age of the firm has an inverse relationship to profitability: younger firms have a slightly higher profitability rate.

Another internal barrier that often relates to growth is the limitation of a firm's human resources. Hughes (1998) notes that sustained growers in small and medium enterprises are more likely to experience management and labour constraints that stalled growers. Mason & Brown (2012) also reveal that recruitment difficulties were one of the major constraints for technology-based enterprises in Scotland. With reference to the resources determining growth performance in Section 2.2.1, many literatures have proven the importance of human resources. Furthermore, human capital has often been associated with economic growth because of the 'brain drain' issue (Bein, Docquier & Rapoport 2001; Wong & Yip 1999). The two countries investigated in this thesis often compete with their neighbour countries to attract working talent. Many Malaysians preferred to work in Singapore while New Zealanders often flock to Australia. This may create a situation where high-growth firms find it challenging to get suitable people to provide creative and innovative ideas for long-term growth. Furthermore, New Zealand was found to provide low percentages of IT graduates (Watson & Myers 2002). Malaysia's unemployed IT graduates who fail to secure a work position often blame their lack of skills (Shah 2008). In this context, the lack of human resources would be considered one of the challenges to the growth of a firm.

Based on the above discussion, it is important to note that these growth challenges are important determinants of a firm's growth performance. In addition, Covin & Slevin (1989) show that environment hostility has a significant impact on the strategy-performance relationship. From the discussion on growth dimensions it can be postulated that a firm's growth performance would be determined by the interactions of these dimensions. However, the extent of influences of these dimensions on each other and on the performance of the firm would need further investigation. As stated by Delmar et al. (2003), all high-growth firms do not grow in the same way. In addition, Wright & Stigliani (2012) call for a greater methodological plurality in the study of growth. The quantitative approach is used widely in examining growth drivers, but addressing 'why' and 'how' research questions would require an alternative method. This thesis proposes to examine two important aspects of growth by employing similar theories. Firstly, the thesis will explain the key characteristics of high-growth firms from a group of sustained and non-sustained high-growers using the dimensions discussed in two Asia Pacific countries. This exploration of growth experiences in the two groups of technology-based firms uses the qualitative approach. A conceptual

model is then build, based on the interview findings. Secondly, the thesis further differentiates the high-growth firms from the non-high-growth firms on the basis of similar dimensions confirmed in the initial stage. Finally, quantitative examinations will be used to examine the interaction and impact of each dimension on the other as well as in determining the firm's performance.

## 2.5 Summary of Chapter

This chapter has described the main concepts used in the thesis. At the start of the chapter, the theories used to investigate firm growth were explained. Next, studies related to high-growth firms, including sustained high-growth firms, were reviewed. Different measures and patterns used to measure firm growth were also outlined. After exploring the studies related to business growth, the technology industry which is the particular industry investigated in this thesis was reviewed to highlight the connection between the scope of the study and the main theoretical concept adopted in it. Consequently, the different dimensions relating to growth performance in general as well as in the specific industry were discussed.

The previous studies reveal difficulties in reaching a consensus on what makes a firm achieve high-growth performance. Different results were based on different industries and countries; therefore it is important to identify the key characteristics of high-growth technology-based firms in Malaysia and New Zealand. In addition, there is limited understanding of high-growth firms in the Asia Pacific region. By conducting a study focused on a group of award-winning high-growth firms, the research can also be used to differentiate these firms from those that fail to achieve such performance. Using a framework that centres on previous theories, this thesis further examines the influences of resource-capabilities, strategies, and growth challenges from internal and external environments on performance. Hence three research questions are formulated to offer more insights to the literature:

1) What are the key characteristics of high-growth technology-based firms in these countries?
2) How do high-growth firms differ from non-high-growth firms?
3) What are the influences of resource-capabilities, strategies and growth challenges from the internal and external environment on performance?

The remaining chapters of this thesis are devoted to the development of the high-growth performance model and to discussion on the empirical testing. Research methodology used to answer the emergent issues drawn from this chapter is outlined in the next chapter.

# CHAPTER 3 METHODOLOGY

## 3.1 Overview

The main purpose of this thesis is to identify characteristics of high-growth technology-based firms. It also aims to identify differences between high-growth and non-high-growth firms in relation to resource-capabilities, strategies and challenges from internal and external environments. To achieve these objectives, a mixed methods research design was adopted in this study.

## 3.2 The Two Paradigms

A paradigm can be defined as an abstract model of a person's view of the world (Guba & Lincoln 1994). The pursuit of research inquiry is often associated with the researcher's view of the world. In another words, paradigms determine a particular orientation to research inquiry which includes what questions to ask, what methods to use, what knowledge to search for and the definition of research quality (Lincoln & Guba 1985; Patton 2001). This is supported by Kuhn (1970) who comments that researchers whose work is based on shared paradigms are devoted to the guidelines and criteria of their particular scientific disciplines. There emerged two main schools of thought in research design. These are the positivist and constructivist research traditions and they are supported strongly by their respective communities of researchers, or 'purists'. Such researchers set boundaries on their own beliefs and are involved in the war of paradigms to justify their research endeavours (Johnson & Onwuegbuzie 2004).

According to Bryman (1984), there is constant debate about quantitative and qualitative research at the epistemological and methods level. The positivists' philosophical assumptions lie with post-positivism and a belief in a singular reality. The researcher and object are independent entities (Sale, Lohfeld & Brazil 2002). They use quantitative approaches that focus on gathering, analysing, interpreting and presenting numerical information to answer research questions (Teddlie & Tashakkori 2009). This involves deductive reasoning and theoretical testing. The methods used to collect information include highly structured protocols such as self-completion questionnaires, as well as secondary and official statistics. Meanwhile, the constructivists believe in multiple realities and adopt a qualitative approach in finding answers. In another words,

the reality is socially constructed (Berger & Luckmann 2002) and constantly changes. There is an interactive link between the researcher and the object of study (Guba & Lincoln 1994). According to Skinner, Tagg & Halloway (2000), qualitative research focuses on people's experiences and the meaning they place on the events, processes and structures of their normal social setting. This places the focus on inductive reasoning and new discovery. Methods used in the qualitative studies include in-depth interviews, focus groups, and ethnography and participant observation. Both paradigms have benefits and costs, strengths and weaknesses. The quantitative approach requires larger sample sizes compared to qualitative approach to allow statistical validity and representation (Carey 1993). Qualitative approaches emphasise small and purposeful samples to provide important insights rather than statistical validity (Russell & Gregory 2003; Reid 1996). Johnson & Onwuegbuzie (2004) have outlined the strengths and weaknesses of both approaches. Undeniably, there are situations when a research question is better answered with a quantitative rather than a qualitative approach and vice versa. Nevertheless, each set of quantitative and qualitative 'purists' view their paradigm as superior and often argue the incompatibility of the paradigms (Howe 1988). The fundamental differences between the two research paradigms are set out in Table 3-1.

**Table 3-1 Fundamental Differences between Quantitative And Qualitative Research**

| | **Quantitative** | **Qualitative** |
|---|---|---|
| **Role of theory** | Deductive, testing of theory | Inductive, generation of theory |
| **Epistemological orientation** | Natural science model, positivism, finding truth | Interpretivism, findings created through interaction of researchers and researched. |
| **Ontological orientation** | Objectivism, naive realism | Constructivism, local and specific constructed realities |
| **Methodological orientation** | Experimental/manipulative: verification of hypotheses; chiefly quantitative methods | Hermeneutical/dialectical |

*Source: Adapted from Guba & Lincoln (1994,) page 109 and Bryman & Bell (2003), page 28*

Denzin & Lincoln (2000) also point out the five significant differences between qualitative and quantitative research. Their differences are in in the uses of positivism and post- positivism; acceptance of postmodern sensibilities; capturing the individual's power of view; examining the constraints of everyday life; and the securing of rich descriptions. Because of the significant differences between the two paradigms, many authors (Kuhn 1970; Smith & Heshusius 1986; Rossman & Wilson 1985) think that it

is impossible to conduct a study using both quantitative and qualitative designs, hence many researchers tend to position themselves as either qualitative or quantitative researchers. Nevertheless, Onwuegbuzie & Leech (2005) cast doubt on the possibility of having 'pure' qualitative and quantitative research. They argue that the researcher often relies on subjectivity when choosing the relevant items to include in an instrument such as survey that yield empirical data. As a result, any interpretation of the empirical results cannot be 100% objective.

Conversely, Sale et al. (2002) acknowledge the two paradigms are incommensurate but propose the possibility of multiple methods in a single study. They argue that the two paradigms are compatible because they use theory-laden facts and a well-defined inquiry process. In addition, Johnson & Onwuegbuzie (2004) also comment that the two approaches as they both use empirical observations to fulfil research queries. The differences in epistemological beliefs should not prevent a qualitative researcher from using data collection methods that usually used by quantitative researcher, and vice versa. This is support by Dzurec & Abraham (1993) where they claim both sets of researchers select and use analytical techniques to generate maximal meaning from their data, based on their respective views of reality.

### 3.3 Mixed Methods Research

The research environment began to change over the past 20 years when a new community of researchers founded a third research paradigm called mixed methods (Johnson & Onwuegbuzie 2004). Howe (1988) argues that the issue of paradigm incompatibility vanishes as paradigms are evaluated on how well they fulfil the research needs. Prior to this, Sieber (1973) suggested that researchers should utilise the strengths of both methods in order to better understand social phenomenon. Hence, the third group of researchers started to work along a continuum where the qualitative and quantitative approaches sit at the extreme left and right respectively while mixed methods sit between them. Although there are some situations where a research question is better answered by using either the qualitative or the quantitative approach, greater or richer insights can be gained in some cases by putting both methods together. Mixed methodology is defined in the first issue of the *Journal of Mixed Methods Research* (Tashakkori & Creswell 2007, page 3) as "research in which the investigator

collects and analyses data, integrates the findings and draws inferences using both qualitative and quantitative approaches or methods in a single study or program of inquiry". This third community of researchers argues that qualitative and quantitative research can be meaningfully integrated (Bryman 2006), that is, it represents the real "gold standard" for studying phenomena (Onwuegbuzie & Leech 2004), and it can be utilised to answer questions that could not be answered by one paradigm alone (Leech & Onwuegbuzie 2009). The group emphasises pragmatism as a philosophical orientation (Johnson & Onweugbuzie 2004; Biesta 2010; Bryaman 2006).

Tashakkori & Teddie (2003, page 713) define pragmatism as:

> *"a deconstructive paradigm that debunks concepts such as 'truth' and 'reality' and focuses instead on 'what works' as the truth regarding the research questions under investigation. Pragmatism rejects the either/or choices associated with the paradigm wars, advocates for the use of mixed methods in research, and acknowledges that the values of the researcher play a large role in the interpretation of results."*

The emergence of this philosophy of pragmatism was considered as a pacifier in the war of paradigms between quantitative and qualitative research (Bergman 2011). According to Newman & Benz (1998), pragmatic researchers are more likely to view research as a holistic effort and require long-term involvement with persistent observation and triangulation. Patton (1988) also note that pragmatism does not require to resolve any contradictions between different paradigms, but putting the rationale for mixing methods situational responsiveness and devoting to an empirical perspective. In Table 3-2, Creswell & Plano (2011) summarise the different research paradigms or worldviews with their practical implications based on philosophical assumptions. Though it seems that mixed methods research is identified with pragmatism, there is no general agreement in the mixed methods community on which worldview best fits a mixed methods study.

According to Johnson, Onwuegbuzie & Turner (2007), mixed methods research is an approach to knowledge that attempts to consider multiple viewpoints, perspectives, positions and standpoints (including standpoints of qualitative and quantitative research). It also focuses on the dictatorship of research questions and allows

qualitative and quantitative methods to be mixed to offer the best answers to research questions. However, mixed methods research should not be considered superior to mono-method research. Bergman (2011) highlights key weaknesses, challenges and unresolved problems especially in the conceptualisation and design of mixed methods. The quality of a mixed methods research study strongly depends on the researcher's ability to justify the research purposes and to integrate and validate the research.

**Table 3-2 Elements of Worldviews and Implications For Practice**

| Worldview elements | Post-positivism | Constructivism | Pragmatism |
|---|---|---|---|
| **Ontology** | Singular reality | Multiple realities | Singular and multiple realities |
| **Epistemology** | Distance and impartiality | Closeness | Practicality |
| **Axiology** | Unbiased | Biased | Multiple stances |
| **Methodology** | Deductive | Inductive | Combining both |
| **Rhetoric** | Formal style | Informal style | Formal or informal style |

*Source: Adapted from Creswell & Plano (2011), page 42*

A number of scholars provide sound rationales for using mixed methods in a research study. Tashakkori & Teddlie (2008) summarise the research purposes (shown in Table 3-3) in the work of Greene, Caracelli & Graham (1989); Patton (2001); Tashakkori & Teddlie (2003), Creswell (2003) and Rossman & Wilson (1985).

**Table 3-3 Purposes for Mixed Methods**

| Purpose | Description |
|---|---|
| Complementarity | Mixed methods are utilised in order to gain complementary views about the same phenomenon or relationship. Research questions for the two strands of mixed study address related aspects of the same phenomenon. |
| Completeness | Mixed methods designs are utilised in order to make sure a complete picture of the phenomenon is obtained. The full picture is more meaningful than each of the components. |
| Developmental | Questions for one strand emerge from the inferences of a previous one (sequential mixed methods) or one strand provides hypotheses to be tested in the next one. |
| Expansion | Mixed methods are used in order to explain or expand the understanding obtained in a previous strand of a study. |
| Corroboration/ confirmation | Mixed methods are used in order to assess the credibility of inferences obtained from one approach (strand). Usually there are both exploratory and explanatory questions. |
| Compensation | Mixed methods enable the researcher to compensate for the weaknesses of one approach by utilising the other. |
| Diversity | Mixed methods are used with the hope of obtaining divergent pictures of the same phenomenon. These divergent findings would ideally be compared and contrasted. |

*Source: Tashakkori & Teddlie (2008), page 102*

This thesis aims to investigate the high-growth characteristics of technology-based firms in terms of resource-capabilities, strategies and challenges from internal and external environment. There are limited literatures or constructs available to evaluate the relationship between these dimensions and the high-growth performance of technology-based firms, therefore this thesis uses mixed methods approach to characterise and differentiate high-growth firms. Based on the exploratory sequential mixed method design, the worldview or paradigm moves from working in accordance to constructivist principles, during the qualitative phase, to post-positivism when looking at the measurements and hypotheses tested in the quantitative phase. The sequential stages in the research design indicate a shift of research paradigm during the process. This shift is supported by Patton's (1980) proposal of paradigm of choices, where different methods are appropriate for different situation and research questions. The three research questions outlined in Section 1.7 require an initial exploratory approach to determine variables and relationships followed by confirmation of these relationships.

According to the purposes listed in Table 3-3, this thesis chose a mixed methods approach to ensure complementary views as well as for developmental reasons. The initial qualitative study explored the underpinning variables of high-growth experiences. In order to avoid making wrong inferences, a quantitative study of technology-based firms was then conducted. A questionnaire was developed and served as a bridge between the two stages of the mixed methods study. The variables and themes that emerged from the interviews were used to develop the questionnaire. Several hypotheses were also built on the initial findings of the qualitative study and these hypotheses were tested with data collected from the questionnaire survey of a wider group of technology-based firms which were selected regardless of growth performance. These firms were chosen from similar industry groups and geographical locations, so findings from the survey differentiated variables for different growth performance. This exploratory sequential mixed methods design therefore strengthened the reliability and validity of the study.

### 3.4 Research Design

Research design explains the steps taken to collect, analyse, interpret and report the data used to answer the questions in a study. Creswell & Plano (2011) suggest six major mixed methods research designs. They are: convergent parallel design; explanatory sequential design; exploratory sequential design; embedded design; transformative design; multiphase design. Each design is used according to the purpose of the research. With reference to the objectives and research questions, this study adopts the exploratory sequential mixed methods design for the following reasons. First, the study seeks to explore high firm growth, a phenomenon considered to be more likely in volatile and expanding industries such as those based on high-technologies. Secondly, there is no widely-accepted model underpinning research into high-growth firms, especially in the Asia Pacific region. Thirdly, there is a need to develop an instrument to suggest possible constructs in high-growth dimensions. Finally, this study attempts to provide general conclusions from the high growth phenomenon and to confirm observations derived from the qualitative case studies. Figure 3.1 is a diagram of the exploratory sequential mixed methods design for this study. This design has been used in a number of researches (Mak & Marshall 2004; Sharman & Vredenburg 1998; Thornhill & Amit 2001). A detailed explanation on each stage is in the following sections.

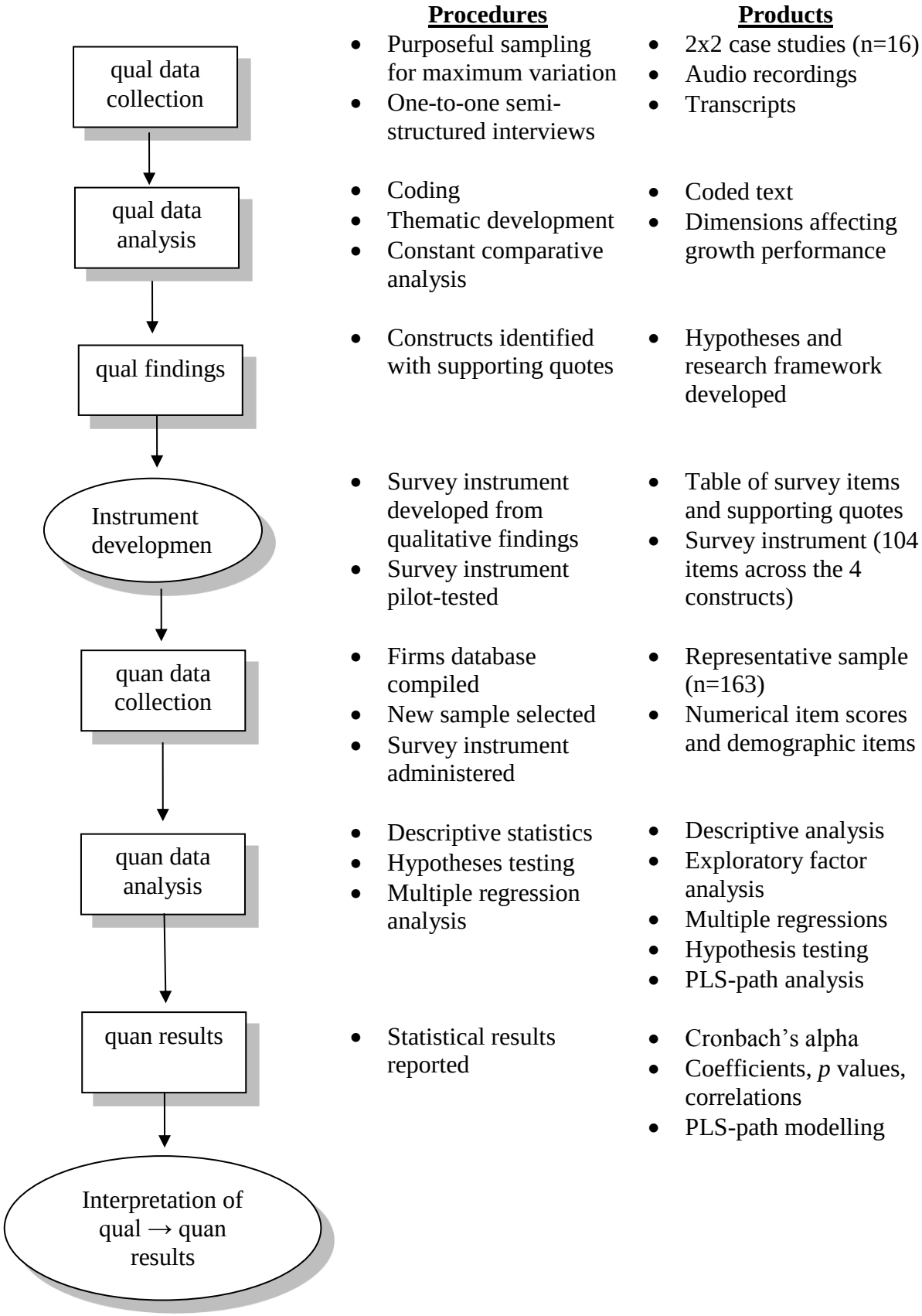



**Figure 3.1 Exploratory Sequential Mixed Methods Design Diagram**

### *3.4.1Study 1: Case Study*

Case study research is becoming more popular in management studies. It is used for developing and testing theory. In a recent definition, a case study is a study in which one case (single case study) or a small number of cases (comparative case study) are selected in their real life context, and scores obtained from these cases are analysed in a qualitative manner (Dul & Hak 2008). It is a method popularly used in clinical research where every patient represents a unique case study. Its main purpose is to gather comprehensive, organised, and in-depth information about each case of interest (Patton 2001). Nevertheless, its ability to develop and test theory in management research is well demonstrated in several strategic management studies (Burgelman 1983; Graebner, 2004; Graebner & Eisenhart 2004; Chen & Lee 2009). According to Gibbert, Ruigrok & Wicki (2008), case studies are the most appropriate tool in early phases of a new management theory, when key variables and relationships are being explored. Eisenhardt (1989) note that case studies combine data collection methods such as archives, interview, questionnaire and observation. Thus, the evidence may be qualitative, quantitative or both. In this thesis, case study is adopted to provide qualitative data that are used to develop an instrument for quantitative evaluation in larger samples.

While laboratory experiments isolate the phenomena from their context, case studies emphasise the rich, real-world context in which phenomena occur (Eisenhardt 1989; 1991; Eisenhard & Graebner 2007). As this research endeavoured to find out the process and content of growth experiences in technology-based firms, the case study method was appropriate. Research questions that ask ‘how’ and ‘why’ are more explanatory and deal with operational links that need to be traced over time (Yin 2009). Besides, growth experiences are not inward-looking but environmentally influenced. It is important to note industry events and phenomena. During the period of study the world economy was recovering from the 2008 financial crisis, therefore it is important to know what helped these high growers overcome the crisis and outperform other players in the industry.

There are four key criteria with which to assess the rigor of case study research: construct validity, internal validity, external validity and reliability. Construct validity refers to the extent to which a procedure leads to an accurate observation of reality

(Denzin & Lincoln 1994) and it needs to be considered during the data collection process. Gibbert et al. (2008) suggest that internal validity is determined when the researcher provides a plausible causal argument, logical reasoning to defend the research conclusions. They propose three measures to enhance internal validity: clear research framework, pattern matching and theory triangulation. External validity is defined as the degree to which the findings can generalise (Bryman & Bell 2003). It seems unachievable in case studies research as cases are studied in different setting but Eisenhardt (1989) argues that cross-case analysis involving four to ten case studies offer analytical generalisation. Finally, reliability is confirmed when a same case study is conducted by a subsequent researcher following the same procedures all over again, this researcher should generate the same findings and conclusions. Reliability aims to minimise error and biases in a study (Denzin & Lincoln 1994; Yin 2009).

Yin (2009) has identified several tactics for dealing with the four criteria when doing case studies. Table 3-4 listed the four widely-used tests to establish quality empirical research and the recommended case study tactics. This research adopted these tactics to improve its rigor. Each of the applications is explained in the related section.

**Table 3-4 Case Study Tactics for Four Design Tests**

| Test | Case study tactic | Phase of research in which tactic occurs |
|---|---|---|
| Construct validity | • Use multiple resources of evidence<br>• Establish chain of evidence<br>• Have key informants review draft case study report | Data collection<br>Data collection<br>Composition |
| Internal validity | • Do pattern matching<br>• Do explanation building<br>• Address rival explanation<br>• Use logic models | Data analysis<br>Data analysis<br>Data analysis<br>Data analysis |
| External validity | • Use theory in single-case studies<br>• Use replication logic in multiple-case studies | Research design<br>Research design |
| Reliability | • Use case study protocol<br>• Develop case study database | Data collection<br>Data collection |

*Source: Yin (2009), page 41*

In the earlier stage of research, comparative qualitative case studies were conducted in two countries, Malaysia and New Zealand. The exploratory sequential mixed methods design suggests that the first phase of study should produce multiple perspectives and deeper understanding. This requires case studies of award winning high-growing firms. It was important to recruit participants with relevant high-growth experience in order to provide a comprehensive understanding of their growth. Owners or managers of

sustained high-growth and non-sustained high-growth firms were interviewed about their growth experiences, especially in relation to resource-capabilities, strategies and challenges in the external and internal environment. Firms that had sustained high growth were selected alongside the more common non-sustained high growers. These 2x2 comparative case studies provide a comprehensive view of growth experiences and make possible a cross-case comparison of sustained and non-sustained high-growers. Furthermore, it also enhances the external validity of the case studies where more than ten case studies are used for analytical generalisation (Eisenhardt 1989). Malaysia was chosen as a case study country because the number of firms in the Technology Fast 500 Asia Pacific Ranking slipped year by year in spite of growing numbers of technology-based firms certified as having MSC (Multimedia Super Corridor) status. On the other hand, the number of New Zealand technology-based firms ranked in the same lists increased consistently. New Zealand achieved a record high number of rankings in the year 2009 whereas many Asia Pacific countries had fewer firms in these rankings. The technology sectors in both Malaysia and New Zealand were highly dependent on the software, internet and telecommunications industries. Their sector profiles were considered to be similar and yet they delivered different growth results. The firms that were studied fulfilled both fast growth and high growth criteria as they had grown considerably and rapidly.

An analysis of the Deloitte Technology Fast 500 Asia Pacific Ranking 2004-2009 was conducted in order to identify suitable firms for the case studies, and 16 firms in Malaysia and New Zealand were selected. Eight sustained high-growth firms were chosen for interviews in each country. Each had won rankings for at least two consecutive years and recorded high growth for more than five years. Another eight firms were chosen in each country from the same ranking system, this time with non-sustained high growth (that is, they had won rankings in only one year and recorded high growth for no more than three years). Findings from these interviews were transcribed and coded. Discrete ideas were clustered and categorised to identify themes based on open coding. Negative case analyses were also used to establish credibility.

Findings from the qualitative case studies were used to develop a self-administered questionnaire for all technology-based firms in the two countries. The questionnaire was designed to provide generalisations of the ideas gathered from the case studies.

Variables and constructs from the questionnaire were derived from themes and ideas in the qualitative analysis.

**Instruments and Sampling**

In-depth semi-structured interviews were conducted with key decision-makers to find out how their technology-based firms achieved high growth. However, flexibility was allowed during the data collection through the full exploration of specific issues raised by interviewees. Questions were mainly on the development history of firms, their resource-capabilities, strategies and the challenges from their internal and external environments.

Theoretical sampling is more appropriate than random sampling for theory development research. Theoretical sampling means that cases are selected because of their suitability in the research context. Such research involves multiple case comparisons to clarify whether an emergent finding is simply idiosyncratic to a single case or consistently replicated by several cases (Eisenhardt 1991), therefore cases are chosen for theoretical reasons. In the research discussed here, firms that experienced high growth for short periods (3 years or less) or over a longer period of time (more than 5 years) were chosen in each of the two different countries. The countries chosen, New Zealand and Malaysia, have exhibited relatively different performances in terms of producing high-growth technology-based firms. The case comparison method is used to identify similarities and differences between the cases. By using both positive (sustained high-growth) and negative (non-sustained high growth) cases, illusory differences and commonalities can be minimised (Ragin 1989). Table 3-5 summarises the chosen cases in each category.

**Table 3-5 Case Categories**

| Country | Sustained high grower | Non-sustained high grower |
|---|---|---|
| New Zealand | 4 cases | 4 cases |
| Malaysia | 4 cases | 4 cases |

This study uses the Deloitte Technology Fast 500 Asia Pacific Ranking to choose firms in each of the categories. All firms awarded this ranking have experienced more than 100% growth for consecutive three years. Positive cases were selected from firms that have won the award for at least two consecutive years and therefore achieved high

growth for at least five consecutive years. In selecting non-sustained high-growth firms, the researcher approached firms that had been in the ranking for only a year and achieved high growth for a three-year period but had been unable to sustain similar growth performance the following year. The specific industry sectors of these selected cases ranged from software, internet and communications/networks to computer/peripherals. Comparing cases within similar growth periods and industry sectors improved the external validity of the case studies. Emergent themes and patterns were cross-checked within and between cases. Multiple cases within each category allowed for findings to be replicated between categories (Eisenhardt 1989). Replication logic was built during this process.

**Data collection procedures**

Two important criteria to ensure the rigor of case studies in this thesis: construct validity and reliability are embedded carefully in the data collection procedures. A multiple data collection method was employed in order to provide triangulation of evidence. Before the interviews were conducted, individual firms were profiled and industry news collected. Government periodicals, statistical reports and analysis from international organisations such as the OECD were studied and cooperation was sought from government agencies in order to access important firm-related information. A few key constructs were identified in relation to the growth experiences of firms. By these means the construct validity of the research was improved.

An interview protocol (Appendix C) was developed to enhance the reliability of the research. This protocol was applied in every interview. A detailed research proposal outlining the framework, questions and procedures was prepared. Ethical approval was obtained from the University of Canterbury. Field procedure was developed to ensure consistency in each case study. Each case study was considered as a single data report and was kept in the case study database. This database consists of interview notes, transcripts, company documents and relevant information collected in this process. As such, reliability of the case studies is ensured in this study.

**Data analysis procedures**

All sixteen interview sessions were recorded and transcribed by professional transcribers. The interview transcripts were analysed using qualitative analysis software

called Nvivo version 9. Following the suggestions from Yin (2009), steps were taken in the analytic process to warrant internal validity of the case studies. First, within-case analysis was conducted on all the sixteen cases. As the study adopted semi-structured interview methods, constructs such as a firm's profile and its resource-capabilities, performance profile, strategies, external and internal environment were set up prior to the coding. Every case was analysed individually by arranging its properties into related constructs. Secondly, re-organisation of the properties was done for every construct. Some properties were grouped under sub-categories that belonged to the construct. By doing this, major concepts could be identified within a theoretical premise. Cross-case analysis was then done by comparing countries of origin and sustained and non-sustained growth categories. Once the studies had been coded into the software, the properties in each case could be seen easily, and concepts or findings which were dominant in one or other country or category were easily recognised. Major similarities and differences in each category were noted in the analysis. Consequently, a research framework was built and the pattern matching was conducted by comparing the observed patterns with previous studies (See Section 4.7). Table 3-6 shows an example of the coding strands for the role of government in each of the two countries. The number in ( ) denotes the number of firms involved.

**Table 3-6 Coding Strands within External Environment Coding Tree**

| Dimension | Sources | Sub-category | Resources/activities |
|---|---|---|---|
| External Environment | Government role | New Zealand | • International expansion (3)<br>• R& D grants (3)<br>• Business advices (2)<br>• Marketing grants(1)<br>• Limited (5) |
| | | Malaysia | • MSC status tax exemption (8)<br>• Technology policies (3)<br>• International expansion (3)<br>• R&D grant (1)<br>• Marketing grants (1)<br>• Subsidies on intern wages (1) |

Table 3-7 shows the coding strands within the individual profiles of each of the sixteen firms. The coding also identifies some key concepts that emerged from the strands (*in italics*). The interview transcripts were analysed, using these procedures, in five main dimensions: firm profile, performance profile, strategies, external and internal

environment. Data coding based on country is in Appendix D while Appendix E has the coding based on growth category.

**Table 3-7 Firm Profile Data Strands**

| Dimension | Category | Sub-category | Findings/remarks |
|---|---|---|---|
| Firm Profile | Year Founded | New Zealand | 1990-1999 (4)<br>2000 & after (4) |
| | | Malaysia | 1990-1999 (3)<br>2000 & after 5 |
| | Number of Founders | New Zealand | 2-5 founders (all) |
| | | Malaysia | 1 founder (2)<br>2-5 founders (6)<br>*Team founding* |
| | Founders' experience | New Zealand & Malaysia | *All founders interviewed have relevant work experience in IT or related industries.* |
| | Founders=CEO | Non-founder CEO:<br>NZ (4)<br>Malaysia (1) | *NZ has more inclination to invite new management talent.* |

**Hypotheses and Survey Development**

After analysis using Nvivo and key concepts development from data strands, a research framework was developed from the case study findings. Findings from the qualitative study using the case study approach are explained in Chapter 4. As explained earlier, the main purpose of conducting a exploratory sequential mixed methods design was to use the findings from the qualitative study to develop a survey instrument and hypotheses for theory testing. The only significant difference between the growth experiences of New Zealand and Malaysia was in the different approaches by their respective governments to the technology industry. Similarly, no significant difference was found across all the dimensions between sustained high-growers and non-sustained high-growers. The research framework in Figure 4.1, Chapter 4 shows the relationships between constructs and important themes/findings that emerged from qualitative analysis based on the experiences of the two countries and their growth categories. Hence twelve (12) hypotheses were built to test the framework:

*H1a: Government policies influence technology-based firms' ability to use resources dynamically (resources dynamism).*

*H1b: Human resources influence technology-based firms' ability to use resources dynamically (resources dynamism).*

*H1c: External relationships/networks influence technology-based firms' ability to use resources dynamically (resources dynamism).*

*H2a Government policies are related positively to the capabilities of technology-based firms.*

*H2b: Human resources are related positively to the capabilities of technology-based firms.*

*H2c: Resources dynamism is related positively to the capabilities of technology-based firms.*

*H2d: External relationships/networks are related positively to the capabilities of technology-based firms*

*H3a: Internal capabilities are related positively to the product innovation strategy of technology-based firms.*

*H3b: Internal capabilities are related positively to the niche focus strategy of technology-based firms.*

*H4a: Product innovation strategy is related positively to the performance of technology-based firms.*

*H4b: Niche-focus strategy is related positively to the performance of technology-based firms.*

*H5: Internal capabilities are related positively to the market expansion strategy of technology-based firms*

*H6: Market expansion strategy is related positively to the performance of technology-based firms.*

*H7a: Internal capabilities are related positively to the remaining-in-private-ownership strategy of technology-based firms*

*H7b: Internal capabilities are related negatively to the acquisition strategy of technology-based firms.*

*H8a: The remaining-in-private-ownership strategy is related negatively to the performance of technology-based firms.*

*H8b: Acquisition strategy is related positively to the performance of technology-based firms.*

*H9a: Internal capabilities are related positively to the strategy flexibility of technology-based firms.*

*H9b: Strategy flexibility is related positively to the performance of technology-based firms.*

*H10a: Competitive industry affects the performance of technology-based firms.*

*H10b: External environment affects the performance of technology-based firms.*

*H11: Human capital is related positively to the performance of technology-based firms.*

*H12: Available finance is related positively to the performance of technology-based firms*

In terms of survey instrument development, key ideas from the transcripts were listed and survey items were constructed from them. Some examples of survey items and supporting quotes are shown in Table 3-8. Further details of instrument development will be discussed in the quantitative study section.

**Table 3-8 Survey Items and Supporting Quotes**

| Item | Supporting Qualitative Data |
|---|---|
| <u>Government Policies</u><br>Government implements policies that successfully developed our innovation capability. | *….when we started, we were building large touch screens and we had a programme to miniaturise. That program was funded by FRST, so we had a sizeable grant to help us do that.* |
| Government provides incentives based on business growth potential. | *The Prime Minister actually opened our PCI launch. ….. We're actively involved with the agencies promoting high growth New Zealand business.* |
| <u>Resources dynamism</u><br>Our firm strives to develop new capability at all times. | *We're going to move. We're moving away from purely services to product development and to reselling products as well. So that will afford us a chance to grow revenue and grow profitability* |
| We always acquire additional resources to fulfil new market needs. | *So we might hire external people just to come in also to do something different rather than loading on existing staff as if it is something different.* |
| We always share resources with other business units. | *Auckland people will work on Wellington projects and vice-versa. We have senior people from Wellington visiting Auckland all the time. We have conferences and events between Auckland and Wellington …we have a centralised intranet.* |
| <u>Human Resources</u><br>Our firm is constantly recruiting people. | *So staff turnaround is always quite high in the industry because the line we work in, the pressure is there right because of the content development timeline, technical support.* |
| Our employees are given training and development opportunities at all time | *So we have a lot of internal training around our policies, procedures, security and all the rest and we have a lot of external training around network management, operations. We have guys going to different courses all over the show on a regular basis.* |

| | |
|---|---|
| External Environment Effects<br>A new challenge/change from the external environment brings new opportunity to our business. | *More people are going to shop online, that is a given. There is a very high adoption of broadband and stuff. The government has got initiatives around getting high speed to everyone. Obviously, more people are going to buy online which will be good for us."* |
| The current external outlook will affect our business. | *It is certainly affecting our business. If PC sales are down in general then that does affect us. I think we've seen from the US in the last few months what they call the back-to-school period is usually time of accelerated PC growth. That didn't happen this year. So we are affected by the global situation.* |
| External environment conditions directly affected our growth performance. | *As I was saying before, there is just less cash in the marketplace, so people can put off buying decisions and all the rest of it.* |
| Market Expansion Strategy<br>Our abilities to segment and target market help us grow. | *We're very proactive with our Tier One customers about helping drive new ideas, new initiatives. So if we can understand their strategy, we come back and present back ways of using technology to help support or enable these strategies."* |
| Our firm is continuously expanding to overseas markets for growth. | *The next pillar of growth .....because we know that if the overseas market is about 2,500, 3,000 bigger than Malaysia, so you are wasting time here. You have to go overseas. You have to be scalable. You must be able to grow quickly.* |
| There are opportunities to expand domestic market for our products/services. | *The first being Wellington. So it's about refining the operation we've got down in Wellington to really hone our skills and our productivity and profitability. We're looking at growing the Auckland market, also increasing the headcount and developing or growing Auckland into a size and a function similar to what Wellington does.* |
| Product Innovation Strategy<br>We offer products/services that are unique and distinctly different from our major competitors. | *So we wanted to reduce as many competitions and we wanted to do something that we very excel on and we can be number one in that space.....<br>that we can be an A of the firms .* |
| We develop products/services with innovative ideas. | *..... do need to come up with ways that are going to appeal to people so that you are a bit different or whatever and innovation does that. Innovation is looking at the things that you can do to make you different from the competition.* |
| Our firm continuously invests in technology and innovation initiatives. | *since we launched in 2008 there has been a lot of learning of the technology. Because even when Malaysia awarded WiMAX spectrum on the 2.6ghz band, think we were the first in Asia Pacific and among pioneers in the world. So we had to figure out the launching of the technology, about the network architecture, design and about the best solutions to compliment the technology etc.* |

### *3.4.2 Study 2: Survey*

The second stage of this study is quantitative and involves survey to obtain original data. This post-positivist approach allows the hypotheses developed from Study 1 to be tested on a statistically-valid sample. According to Punch (2005), there is a continuum of quantitative research designs from experiment to quasi-experiment, with the correlational survey at the end of the continuum. The aim of quantitative data collection is to confirm the relationships between variables based on the model and develop hypotheses. Hence the survey method is used to gather numeric descriptions of opinions from a cross-section of technology-based firms in New Zealand and Malaysia. A self-administered questionnaire was used in the survey. This method is commonly used in similar research in this field (Kyrgidou & Spyropoulou 2012; Moreno & Casillas 2008; Barringer & Bluedorn 1999). The validity and reliability of the survey items are explained in following sections.

**Participant Recruitment**

The target respondents for this study were the Chief Executive Officer/Managing Directors or main decision makers in the technology-based firms. An invitation to participate in the survey and a copy of the questionnaire were sent to the selected firms by mail during January and February 2012. Information on technology-based firms was gathered from two different databases in the two countries. *New Zealand Business Who's Who 2011-2012* and its online edition were used to find the relevant information in New Zealand. All the firms listed under the category of Information Technology and Telecommunications, 850 firms in all, were pulled out from the database. Firms that were interviewed in Study 1 and firms without full business contact information were excluded, so there were 752 mail questionnaires sent out in New Zealand. However, 148 of these questionnaires were returned as wrongly addressed or indicating the business no longer existed, so the final population for this survey was 604 New Zealand firms.

The database used to generate Malaysian firms for the study was the MSC Status Firms Listing, available in the Malaysia Multimedia Development Corporation website. This is an official listing of all firms that have registered with the government under the multimedia super corridor scheme. The database generated 1486 firms in the information technology cluster. This list was cross-validated with the Malaysia Yellow

Pages website to confirm the existence of the businesses and extract their information. As a result, and after excluding the firms that participated in Study 1, 1158 firms were selected to participate in the questionnaire survey. There were 98 questionnaires returned because the address was incorrect or the business no longer existed, therefore the final population for this survey was 1060 firms in Malaysia.

Due to the low response rate from the initial postal questionnaire, the same questionnaire was developed electronically using the University Canterbury online survey tool provided by Qualtrics. Boyer, Olson, Calantone & Jackson (2002) found that electronic surveys were generally comparable to print surveys in most respects. It was hoped that if the invitation letter had been lost in transit or the mailed questionnaire was not replied to then the participants would answer the questionnaire online. A follow-up email was sent to the firm's or contact's email address during the months of May and June 2012. This email explained the previous invitation and mail questionnaire and invited the contacts to fill in the electronic version of the questionnaire if they had not already returned the mailed version.

**Instruments**

The self-administered questionnaire was based on interview findings from the qualitative study and previous similar studies. There were four sections, with 12 open-ended questions and 92 closed-ended questions. The four sections covered the background of the firm (with sub-sections of start-up information and current business information); business performance; capabilities and growth factors (include business strategies; resources and challenges from the internal and external environment). Questions in the background and business performance sections were either open-ended or multi-choice questions in ordinal or nominal scale. Questions in the last two sections were measured on a seven-point Likert scale. Items listed in capabilities were adopted from Barbero et al. (2011), with the scale ranging from *Not Important At All* to *Extremely Important*. Items listed in the sub-sections of resources and challenges from internal and external environments and strategies were scaled from *Strongly Disagree* to *Strongly Agree.* Finally, the items in barriers to growth were measured, in terms of the extent of the hindrance, in a scale from *Not At All* to *To a Large Extent.* A copy of the questionnaire is attached in Appendix F. The following sections explain the measures used to test the research framework showed in Figure 4.1.

### Measures of Organisational Resources and Capabilities

The main source of competitive advantage for the high growers is found in their product/service/technology/managerial capabilities. These advantages usually derive from the resources and capabilities owned by the firms and are therefore the main influences in their growth performance. All measures for organisational resources and capabilities with their sources are shown in Table 3-9. The questionnaire also adopted the measures of managerial capabilities from the study of Barbero et al. 2011. These capabilities were found in Study 1.

**Table 3-9 Organisational Resources and Capabilities Measures**

| Code | Statement (1=Strongly Disagree to 7=Strongly Agree) | Source |
|---|---|---|
| | **Resources Dynamism** | |
| Res1 | We always share resources with other business units (such as firm's subsidiaries). | |
| Res2 | We always acquire additional resources to fulfil new market needs. | Study 1 & |
| Res3 | Our firm strives to develop new capability at all times. | Tan 2007 |
| | **Human Resources (include entrepreneurial impact)** | |
| HR1 | Our firm is constantly recruiting people. | Study 1 |
| HR2 | Our firm's remuneration system is based on individual performance. | |
| HR3 | Our employees are given training and development opportunities at all times. | |
| **Code** | **Capabilities (1=Not Important At All to 7=Extremely Important)** | **Source** |
| | **Innovation capability** | |
| Icap1 | Research and development | Study 1 |
| Icap2 | Investment in new product development | |
| Icap3 | Intellectual property ownership | |
| | **Human Capability** | |
| Hcap1 | Attraction and retention of employees | |
| Hcap2 | Incentives to personnel aligned with firm objectives | Barbero |
| Hcap3 | Employee selection process | et al. |
| Hcap4 | Adequate training for employees | 2011 |
| | **Organisational Capability** | |
| Ocap1 | Existence of control mechanisms | |
| Ocap2 | Adequate organisational structure | Barbero |
| Ocap3 | Existence of a mission and clear objectives | et al. |
| Ocap4 | Efficient and effective task delegation | 2011 |
| Ocap5 | Internal process and systemisation improvement | |
| Ocap6 | Existence of strong leadership | |
| Ocap7 | Existence of a culture aligned with objectives | |
| | **Marketing Capability** | |
| Mcap1 | Search of new growth opportunities | |
| Mcap2 | Customer knowledge | |
| Mcap3 | Current product improvement | |
| Mcap4 | Sales effort | |
| Mcap5 | Strategic planning | |
| | **Financial Capability** | |
| Fcap1 | Cash flow management | |
| Fcap2 | Financial reporting management | |
| Fcap3 | Availability of financial capital | |
| Fcap4 | Cost control | |
| Fcap5 | Historical analysis of financial situation | |

### Measures of External Environment Conditions

Based on the discussion in Chapter 4, the resources for growth are not only drawn internally but also obtained from the external environment. The two major sources of external resources were found to be government policies and external relationships/networks. Both of these stakeholders provided enormous resources for growth in the areas of innovation and marketing as well as human capabilities. The items are either built from quotes in the interview transcripts (Study 1) or adopted from previous studies. All measures for external environment conditions are shown with their sources in Table 3-10.

**Table 3-10 External Environment Conditions Measures**

| | Statement (1=Strongly Disagree to 7=Strongly Agree) | Source |
|---|---|---|
| | **Government Policies** | |
| **Gov1** | Government implements policies that successfully developed our innovation capability. | Study 1 |
| **Gov2** | Government provides incentives based on business growth potentials. | |
| **Gov3** | The current government policies did not help in our business growth.* | |
| | **External Relationships/Networks** | |
| **Ntw1** | Our firm constantly heeds advice from external networks. | Study 1 |
| **Ntw2** | We always form business partnerships with other technology-based firms. | |

**denotes reversed item for quantitative data analysis*

### Measures of Growth Strategies

Findings from Study 1 highlight four growth strategies implemented by the high-growth technology-based firms. The strategies are: market expansion; product differentiation with innovation and niches focus; public ownership and acquisition; strategy flexibility. The items for each strategy were derived either from Study 1 or from previous studies if available. Table 3-11 shows the strategy measures.

**Table 3-11 Growth Strategies Measures**

| | Strategies (1=Strong Disagree to 7=Strongly Agree) | Source |
|---|---|---|
| | **Market Expansion** | |
| **Exp1** | Our firm is continuously expanding to overseas markets for growth. | Study 1 & Tan 2007 |
| **Exp2** | Domestic market is not important for our business growth.* | |
| **Exp3** | There are opportunities to expand the domestic market for our products/services. | |
| **Exp4** | Our abilities to segment and target market help us grow. | |
| **Exp5** | We advertised extensively to reach out to customers. | |
| **Exp6** | Our firm emphasises customer relationship management more than other marketing tools to generate growth. | |
| | **Niche focus** | Study 1 & Covin Selvin & Heeley 2000 |
| **Nic1** | We offer products/services that are unique and distinctly different from our major competitors | |
| **Nic2** | We only offer products/services that we specialise in. | |
| **Nic3** | We target the same market segment/s since establishment. | |

| | | |
|---|---|---|
| | **Product innovation** | |
| **Inn1** | We continuously launch new product/service to capture bigger market share. | Study 1 & Tan 2007 |
| **Inn2** | We develop products/services with innovative ideas. | |
| **Inn3** | The product/service that we offer now is totally different from what we offered during the start up. | |
| **Inn4** | Our firm continuously invests in technology and innovation initiatives | |
| **Inn5** | Managers encourage employees to 'think outside of the box'. | |
| **Inn6** | An emphasis on constant innovation is not part of our corporate culture.* | |
| **Inn7** | Original ideas are highly valued in this firm. | |
| | **Public ownership and acquisition** | |
| **PAC1** | We are willing to sacrifice private ownership to generate funds for growth. | Study 1 |
| **PAC2** | Our firm's owner/s favour total autonomy in decisionmaking.* | |
| **PAC3** | We always look for opportunities to acquire other firms. | |
| **PAC4** | We are willing to be acquired in order to grow the business. | |
| **PAC5** | Acquisitions create more integration issues than growth synergy.* | |
| | **Strategy Flexibility** | |
| **Fle1** | We rely on one business strategy for growth.* | Study 1 |
| **Fle2** | Our business strategy always changes in respond to market changes. | |
| **Fle3** | We adopted several strategies following new business opportunities. | |

**denotes reversed item for quantitative data analysis*

## Measures of Growth Challenges

The growth challenges derived from threats in the external environment as well as barriers from the internal environment. Industry competitiveness and effects from the external environment were found to affect a firm's performance in Study 1. Measures of external environment conditions that affect growth effects were developed from these observations. Two significant barriers to growth performance were identified in Study 1. They are lack of human capital and lack of financial capital. The implications of these resources are explained in Chapter 4. However, there were also a number of barriers indicated by the interviewees. They can be categorised as financial, human capital, marketing and organisational barriers. To investigate the extent of each growth challenge, seven-point Likert scale items were developed that included the following:

**Table 3-12 Growth Challenges Measure**

| | **Statement (1=Strongly Disagree to 7=Strongly Agree)** | **Source** |
|---|---|---|
| | **Highly Competitive** | Covin et al. 2000 |
| **Pete1** | Our firm operates in an industry where head-to-head rivalry is common. | |
| **Pete2** | The failure rate of firms in our industry is high. | |
| **Pete3** | There are several major competitors with roughly equal competitive positions to us. | |
| | **External Environment Effect** | |
| **Ext1** | Our firm faces similar external environment conditions to other players in the same industry. | |
| **Ext2** | The current external environment outlook will badly affect our business. | Study 1 |
| **Ext3** | A new challenge/change from the external environment brings new opportunity to our business. | |
| **Ext4** | External environment conditions directly affected our growth performance. | |
| **Ext5** | Our business strategies are strongly influenced by the external environment conditions. | |

| | Barriers (1=Not at all to 7=To a large extent) | Source |
|---|---|---|
| | **Financial** | Study1 |
| **FBar1** | Insufficient profitability | |
| **FBar2** | Difficulties in getting finance | |
| | **Human capital** | Study1 |
| **HBar1** | Lack of skilled technical expertise | |
| **HBar2** | Lack of managerial talent | |
| **HBar3** | Lack of marketing expertise | |
| | **Marketing** | Study1 |
| **MBar1** | Difficult to meet customers' expectations | |
| **MBar2** | Slow product development | |
| **MBar3** | Uncertainty in the external environment | |
| | **Organisational** | Study1 |
| **OBar1** | Lack of suitable systems to manage growth | |
| **OBar2** | Low personal motivation for growth | |

### Measures of Performance

While the study has a focus on high-growth firms, other aspects of performance are linked to this, particularly profitability (see Davidsson et al. 2009). A range of concomitant performance measures were mentioned during interviews. The most frequently mentioned was sales growth, which is not surprising given the high-growth status of the firms involved. This was followed by an emphasis on profitability. Because of this, three performance measures were used in the questionnaire: sales growth, return on asset (before interest and tax) and return on equity (after tax). Participants were asked to evaluate their business performance over the last three years, on the scale of 1 to 7, in comparison with their competitors, This self-reported subjective measure of performance is often used in organisational performance research (Santos-Vijande, Lopez-Sanchez & Trespalacios 2011; Galbreath & Galvin 2008; Dess 1987). Previous studies (Chandler & Hanks 1993; Dess & Robinson 1984) reveal that owner/CEO/top managers' assessments of business performances such as sales growth, profit and earnings were highly correlated with objective measures.

### Validity and Reliability of Questionnaire

The self-administered questionnaire uses multiple items and measures to test hypotheses and answer the research questions; therefore, it is important to evaluate the quality of this survey instrument. The validity and reliability of the questionnaire were examined. Validity is an assessment of the ability of the scales used in the questionnaire to measure the concept under discussion. Reliability refers to the stability and consistency of the instrument measuring the concepts.

There are two commonly used criteria for evaluating the validity of a questionnaire: content validity and construct validity. Content validity refers to the extent to which an empirical measurement reflects a specific domain of the content (Hair, Black, Babin, Anderson & Tatham 2006). Three methods were used to achieve content validity in this study. First, constructions were based on analysis from the earlier qualitative interviews. Secondly, the comments given by interviewees were used as measurement items, and additional items were selected from extensive literature reviews. Finally, the full list of measurement items was referred to a panel of experts in the area of high-growth business and entrepreneurship.

Construct validity testifies to how well the results obtained from the use of the measure fit the theories around which the test is designed (Cavana, Delahaye & Sekaran 2001). There are two issues related to construct validity: convergent validity and discriminant validity. Convergent validity is confirmed when items measuring the same variables are in high correlation. Conversely, discriminant validity is determined when the items measuring one variable are found not to correlate with the other variable although they can be conceptually similar. Two methods were used in this study to evaluate construct validity. First, Exploratory Factor Analysis based on Principal Component and Varimax rotation was undertaken to determine the relevant items measuring the variables. In addition, the Partial Least Squares analysis on the outer model loadings and cross-loadings was generated to confirm the construct validity. It is also suggested that convergent validity is adequate when constructs have an average variance extracted (AVE) of at least 0.5 and loadings in excess of 0.7 for reflective items (Fornell & Locker 1981). Further explanation on the analysis method is presented in Chapter 5.

According to Hair et al. (2006), reliability is the extent to which a variable or sets of variables is consistent with what it is to measure. This study employed two reliability tests to ensure the consistency of the respondent's answers to all the items in a measure. All of the items that passed the construct validity tests from factor analysis were verified on their internal reliability using Cronbach's alpha reliability tests. Nunally & Bernstein (1994) suggest a cut-off point ($\alpha$=0.7) for the alpha value. Furthermore, composite reliability was also generated for all reflective constructs used in Partial Least Squares (PLS) path modelling analysis. Chin (2010) states that composite reliability is a measure of internal consistency when using PLS. It is recommended that

composite reliability of all variables/constructs (in PLS term) be at least 0.70 to be acceptable and reliable. For formative construct, weights that have significant impact based on T-statistics would be considered. Detailed elaborations on the tests are also discussed in Chapter 5.

**Statistical Procedures**

Four stages were involved in the data analysis using SPSS 20.0 and PLS-graph 3.0. Firstly, data were screened for missing value and incomplete information. Secondly, data involving multi-item variables were run through Exploratory Factor Analysis (EFA) to eliminate survey items with loadings <0.4 on factors (Hair et al. 2006). After confirming the valid items for each variable, internal reliability for each of them was calculated. The descriptive statistics for each item and variable were tabulated to check against any violations of statistical assumptions (e.g., multicollinearity, outliers, normality).

Multiple regression analyses were run in the subsequent stage to test the hypotheses developed from qualitative study. The analyses were split into three regression models: resource-capabilities, capabilities-strategies, and performance model. Standardised coefficients and significance were examined to provide results for the hypotheses developed. Finally, path analysis was used to provide a holistic view on the effects of resource-capabilities on the performance of firms through growth strategies. PLS-path modelling has been employed in similar research areas (Moreno & Casillas, 2008; Lechner & Gudnundsson 2012). The path analyses were also based on different groups of respondent high-growth firms and non-high-growth firms in order to evaluate the differences.

**Partial Least Squares (PLS) path modelling**

The limitations in first-generation techniques, such as regression analysis, in explaining multi layers of linkages between independent and dependent variables at the same time have encouraged more researchers to use Structural Equation Modelling (SEM) as an alternative. According to Gefen, Straub & Boudreau (2000), SEM allows simultaneous modelling of the relationships among multiple independent and dependent constructs. There are two approaches to estimating the parameters of an SEM, the covariance-based approach and the variance-based approach (Haenlein & Kaplan 2004). The

covariance-based approach is often used with a technique named LISREL, while the variance-based approach is widely used with PLS-path modelling. Chin & Newsted (1999) outline several differences between the two approaches, as shown in Table 3-13. Based on the criteria listed in the table, this second approach is used to analyse the findings in this study. The justification of using this approach is explained in the next section.

**Table 3-13 Comparisons between Covariance and Variance-Based SEM**

| Criteria | Covariance-based SEM/LISREL | Variance-based SEM/PLS |
|---|---|---|
| Objective | Parameter oriented | Prediction oriented |
| Approach | Covariance-based | Variance-based/component-based |
| Assumptions | Typically multivariate normal distribution and independent observations (parametric) | Predictor specification (non-parametric) |
| Latent construct score | Indeterminate | Explicitly estimated |
| Epistemic relationship between a latent construct and its indicators | Typically only with reflective indicators | Can be modelled in either formative or reflective mode |
| Implications | Optimal for parameter accuracy | Optimal for prediction accuracy |
| Model complexity | Small to moderate complexity (e.g. less than 100 indicators) | Large complexity (e.g. 100 constructs and 1,000 indicators) |
| Sample size | Minimal recommendations range from 200 to 800 | Minimal recommendations from 30 to 100 cases. |

*Source: Chin & Newsted (1999, p 314)*

PLS-path modelling (PLS) is a statistical approach for modelling complex multivariable relationships among observed and latent constructs (Vinzi, Chin, Henseler & Wang 2010). This approach started when Herman Hold proposed a "soft modelling" with fewer distribution assumptions and sample requirements, to covariance-based SEM. As it does not make distributional assumptions, the commonly used parametric-based tests for significance could not be used. Hence, the evaluation of PLS models relies on prediction-oriented measures that are non-parametric. Its predictive power is assessed by the R-square values, which show the amount of variance in the constructs that are explained by the model. However, the strength of this approach is in its ability to analyse direct and indirect relationships among the constructs, as well as estimating multiple individual item loadings in the context of a theoretically specified model. Thus it avoids biased and inconsistent parameter estimates for equations (Lechner & Gudmundsson 2012).

PLS is defined by two sets of linear equations: the measurement model and the structural model. The measurement model specifies the relationships between a latent construct and its indicators while the structural model explains the relationships between latent constructs, (Henseler, Ringle & Sinkovics 2009). Several techniques are used to evaluate both measurement and structural models. Measurement model evaluation determines the reliability and validity of constructs based on the theoretical context. On the other hand, structural model evaluation assesses the predictive capability of the model according to its paths. Before evaluating the measurement model it is important to recognise whether the latent constructs are formative or reflective.

A formative construct is defined as a construct which consists of a composite of multiple measures where the items/indicators are uncorrelated. The indicators define the characteristics of the construct. They are combined to estimate the underlying construct and weighted according to their relative importance in forming the construct (Ravichandran & Rai 2000). A classic example of formative construct is the socio-economic status which is formed as a combination of education, income, occupation and residence (Diamantopoulous & Winklhofer 2001). As such, the performance measure used in this study is considered to be a formative construct. Performance of technology-based firms is measured by sales growth, return on asset and return on equity, capturing multidimensional aspects. Due to its multidimensional nature, it is not necessary to assess the reliability of a formative construct in PLS. However, it is important to assess the validity of the formative construct. The weight scores with T-statistics of each indicator under performance measure were generated from PLS-graph to examine the validity of the construct. The weight provides information on the importance of each indicator in the formation of the component (Chin 1998). The other aspect of validity, discriminant validity, was assessed by producing the item cross-loadings in the SPSS program. Each block of the indicators is expected to have higher loadings in its respective latent construct than indicators in other latent constructs. Similar validation was done in the reflective constructs.

A reflective construct is a construct which has observed indicators that are affected by the underlying latent construct. The indicators are correlated and with high multicollinearity. Indicators are manifestations of the construct. Therefore, the

indicators are called reflective or effects indicators. Constructs such as perceived ease of use and product satisfaction are often considered as reflective. This is because respondent variations in the latent construct of product satisfaction will cause all of its indicators to reflect those changes. As such, all the measures (except performance) used in the study to examine the effect of resource-capabilities; environment, strategies and barriers on performance are reflective. Reflective indicators are highly correlated and thus should have high internal consistency scores that is composite reliability which can be generated by PLS bootstrapping analysis. This measure of reliability is considered more accurate because it is not influenced by the number of indicators (Brown & Chin 2004). Besides, Fornell & Larcker (1981) suggested using Average Variance Extracted (AVE) to measure the amount of variance that a latent construct captures from its indicators relative to the amount due to measurement error. AVE should exceed 0.50 to indicate 50% or more variance of the indicators should be accounted for (Chin 2010). AVE can be used as a measure for convergent validity as well as construct reliability. It is again generated by bootstrapping procedure in PLS-graph software. In addition, examining the loading of each of the indicator correlating with other indicators in the same construct, or other constructs, can determine the convergent and discriminant validity in the measurement model.

After confirming the validity and reliability of the measurement model, the structural model should be examined to determine the strength and directions of the relationship among theoretical latent constructs (Gefen et al. 2000). PLS estimates the path coefficients of each hypothesised relationship as well as confirming the path significance by performing the resampling technique. Chin (1998) proposes that path coefficients should be around 0.20 and ideally above 0.30 to be considered meaningful. Besides path coefficients, R-square value for each of the dependent variables is important to assess the predictive power of the structural model. R-square represents the amount of variance in the construct in question that is explained by the model (Chin 2010).

Rather than assuming equal weights for all indicators of a latent variable (as in traditional regression model), the PLS algorithm allows each indicator to vary in how much it contributes to the composite score for the latent variable (Chin, Marcolin & Newsted 2003). Thus it provides a more realistic view of relationships among the

principal constructs and their underlying items. PLS not only validates hypothesised relationships at theoretical model level, it also determines how well the measures/indicators relate to each construct. Despite its wide application in information system research fields, PLS is very relevant in management research as most of the theoretical concepts are measured by more than one aspect. Therefore, it is used in this thesis to examine the relationship between resource-capabilities, strategies, challenges and performance.

**Justification for the use of PLS**

There are several reasons to use PLS in this study. First of all, the hypothesised model was developed based on interview findings from a selection of high-growth firms. The majority of the questionnaire items were developed from the interviews, therefore it is important to evaluate the relevance of these items. As PLS allows assessment of the psychometric properties of the constructs (measurement model) within its theoretical context (structural model) (Chin 2010), it is suitable for use in this thesis. Secondly, the quantitative study uses both reflective and formative constructs to build the theoretical model which can be used in variance-based PLS but not covariance-based SEM. Furthermore, PLS does not require the assumptions of multivariate normal distribution. This study uses convenience sampling from groups of technology-based firms in two different countries, thus the data might not be normal. According to Chin et al. (2003), the sample requirement for PLS is much lower compared to covariance-based SEM in LISREL. Their study shows that PLS can be performed successfully with a sample size as low as 30 as well as a more complex model with 21 constructs, 672 indicators and 210 cases. The minimum sample requirement in PLS would be ten times i) the greatest number of formative indicators in a construct, or ii) the greatest number of structural paths going into a construct, whichever is higher. Referring to the proposed research model (see Chapter 4), the minimum sample required would be 50. Considering that the sample size in this study is 163, it is possible to capture the largest number of structural paths in the model. Finally, the multiple regression analysis used to confirm the hypotheses developed from Study 1 could not examine the relationship of all constructs based on path analysis in the hypothesised model. Hence, PLS is used to check multiple-dependence relationships between all the constructs. The PLS software used in this study is PLS-Graph version 3.00 Build 1130.

### 3.5 Ethical Considerations

This study followed the guidelines prescribed by the University of Canterbury Human Ethics Committee. As the study was conducted in two sequential data collection stages, two separate applications were submitted to the Human Ethics Committee. The first application in August 2010 was to conduct sixteen interviews with top managers in New Zealand and Malaysia. The research information sheet and consent form prepared for the participants and the interview protocols were submitted along with the application form. The application was approved by the committee in the same month. After the interviews were conducted and a self-administered questionnaire was developed, a second application was lodged to the same committee in December 2011. This application also included copies of the questionnaire and research information sheet, and it was also approved within a month.

This approval was mentioned in the covering letter sent to participants recruited for interviews and surveys. All participants were informed of the research objectives, voluntary participation, non-obligation to answer all the questions and confidentiality of their participation, and assured of their anonymity when the outcome of the findings was published. In addition, top managers involved in the interviews were asked to sign a consent form which informed them of their right to withdraw from the study at any stage. Documents related to this section are attached in Appendix G.

### 3.6 Summary

This chapter explains the methodology used in the study. The discussion is divided into two major sections covering the research paradigm proposed for the study and the application of the exploratory sequential mixed methods design. In the section on method design the discussion is again separated, based on the two data collection approaches: case study interviews and questionnaire survey. For the first approach, the instrument, sampling and data collection procedures are presented in detailed. Next, the thematic analysis of the interview data using Nvivo is discussed. Hypotheses based on the data analysis findings are developed. An important integration between the mixed methods is outlined by explaining survey items developed from case study interviews. Subsequently, participant recruitment and instrument development describing the key measures hypothesised in the research model are discussed within the framework of the

survey questionnaire. Statistical procedures adopted in analysing the completed questionnaires, which include verifying the validity and reliability of the questionnaire are discussed. PLS is introduced as the structural equation modelling technique used to analyse the data and the use of this technique is justified. Then ethical considerations for the study are outlined. The following chapters describe findings from both the qualitative and quantitative data collection approaches.

# CHAPTER FOUR STUDY 1: ANALYSIS AND FINDINGS

## 4.1 Overview

This chapter discusses findings from the interviews conducted in Malaysia and New Zealand and develops hypotheses on technology-based firms. A self-administered questionnaire is subsequently developed to test these hypotheses.

## 4.2 Profile of High-Growth Firms

Based on Deloitte Fast 500 Asia Pacific Rankings from 2006 to 2009, eight high-growth firms in Malaysia and New Zealand respectively were selected and interviewed. Another four firms in each country that had been in the ranking for only a year were considered as non-sustained high growers in the study. Brief descriptions of the sixteen firms are in Appendix H. Name of the firms has been changed to ensure anonymity. Pseudonym is used throughout the thesis discussion.

Firms in the non-sustained high-growth group (Appendix E) were found to have no significant differences from those in the sustained high-grower group. These two groups do not appear to have different characteristics. As the Deloitte Fast 500 Asia Pacific Ranking is awarded from a pool of applicants, some of the firms interviewed may have been awarded ranking one year but chosen not to apply the following year. Another explanation is that the difference between sustained and non-sustained high growers is minimal during their high growth periods. Because only a limited number of firms are awarded in the ranking, those that have won for two to five years are considered to be sustained high growers while firms that win only once are considered non-sustained high growers. There are discrepancies of only one to three years between the two groups in their high-growth periods, so it is not surprising that no significant difference was found. All the firm's profiles are shown in Table 4-1

**Table 4-1Profile for Firms Interviewed**

| Firm Name | Country | Year Founded | Number of founder | Number of Employees | Winning Year/s |
|---|---|---|---|---|---|
| Creative Sign | Malaysia | 2003 | 4 | Less than 50 | 3 years |
| B2B System | Malaysia | 2000 | 5 | 100-150 | 3 years |
| Mobile Pack | Malaysia | 2000 | 1 | More than 250 | 2 years |
| Possibilities Software | Malaysia | 1996 | 1 | Less than 50 | 2 years |
| Innovation Centric | Malaysia | 2000 | 2 | Less than 50 | 1 year |
| Secure Boundary | Malaysia | 2000 | 2 | 50-100 | 1 year |
| Bank Link | Malaysia | 1997 | 3 | 100-150 | 1 year |
| Data Media | Malaysia | 1997 | 3 | More than 250 | 1 year |
| Future Screen | New Zealand | 2000 | 3 | 100-150 | 5 years |
| Alpha Pulse | New Zealand | 1999 | 2 | 100-150 | 4 years |
| Mega Connection | New Zealand | 2000 | 2 | Less than 50 | 3 years |
| The Race | New Zealand | 1999 | 3 | Less than 50 | 3 years |
| Rise Tech | New Zealand | 1992 | 2 | Less than 50 | 1 year |
| Inflame | New Zealand | 2001 | 5 | 50-100 | 1 year |
| Green Cue | New Zealand | 2003 | 2 | Less than 50 | 1 year |
| NZ Link | New Zealand | 1998 | 2 | Less than 50 | 1 year |

***Names were changed to ensure anonymity.*

From the total of sixteen firms, nine were founded in 2000 or later while seven firms were founded between 1990 and 1999. The youngest firm in the study was founded in 2003. This shows that these high-growing firms had established their presence in the industry for at least five years before winning high-growth status in the Asia Pacific region. It also shows that the seven firms founded before the year 2000 survived the dotcom bubble-burst. From the current employee numbers in the firms interviewed, only two Malaysian firms employed more than 250 people, and eight firms had less than 50 employees. Though staff numbers increase as a result of expansion, revenue growth is much higher than employment growth. This could be due to the nature of businesses where a similar technology solution or service can be sold to a new customer without requiring additional capital production. The OECD (2005) definition of a Small Medium Enterprise (SME) is a firm that is non-subsidiary and has less than 250 employees (based on the most frequent upper limit). In this study, only two firms do not fit the definition because they are subsidiaries of a larger corporation, while the others can be considered as SMEs.

The interviews reveal that team founding is an important characteristic of high-growth firms in both countries. Only two of the Malaysian firms were founded by a single person while the others had between two and five founders. All the founders of high-growth firms had relevant work experience in technology or related industries. This is

consistent with the findings of Fesser & Willard (1990), Siegel et al. (1993) and Almus & Nerlinger (1999) in the United States. Team founding provides a better set of skills and experiences to support growth than one person can provide. Previous experience in related industries also helps founding members to identify niche needs in the industry and create suitable solutions to meet them. One of the CEOs commented on the experience of his firm's founders:

> *They had a basic knowledge of the emergence of broadband because when they started the firm there were only 4,000 people with broadband in New Zealand. So they had an understanding of some of the issues associated with broadband and effectively they worked to resolve some of those issues with small to medium sized businesses.*

Another director in a Malaysian firm shared similar views:

> *We were working in a big corporation in similar area. So after a while one day we are looking at the Internet booming so we decided why not we come out and do something. So we decided to come out and form this firm that have more emphasised on Internet technology.*

It is interesting to note that the founders of the Malaysia firms all received their higher education overseas. Three firms were founded by new graduates from the United States. Most of them had strong entrepreneurial aspirations driven by overseas exposure or family influences and therefore they were eager to set up technology-based firms in highly competitive markets. On the other hand, most of the New Zealand founders were graduates from local universities. Their aspirations were mostly driven by accumulated industry experience and market opportunities. Many of these founders had strong technical knowledge of the industry but limited management skills. Founders from four New Zealand high-growth firms invited others with stronger management backgrounds to take up Chief Executive Officer (CEO) roles, and these founders then stepped down to concentrate on product development or research initiatives. These firms achieved high-growth status after the appointment of new professional management. In comparison, Malaysian founders prefer strong management control, with the exception of one publicly-listed firm which has invited a new person in to the CEO position.

Whether they are in sustained or non-sustained high growth firms, New Zealand founders are more open to new management talent.

In terms of organizational structures, only one Malaysian firm (a sustained high grower) did not have a hierarchical structure whereas the others had adopted functional structures. The firm that applied non-hierarchical management treated its software developers as system owners. The Managing Director, who is also the founder, explained:

> *No hierarchy, team member are "owner" of each System Module. Owner as in, not legal, but owner as in they are responsible. So we got seven key personnel in the firm, each taking responsibility on a certain area.*

The other firms that adopted functional structures usually had a product development or research and development department, finance department, sales and marketing department and technical support department. Six out of the sixteen firms interviewed had incorporated subsidiaries and geographical elements into their organisational structures. For example, a New Zealand internet search firm that belongs to a firm listed in Australia Stock Exchange has CEOs in different locations and these CEOs also take care of their subsidiaries in each particular location.

The sixteen firms interviewed used similar performance measures, especially sales growth and profitability, but some also mentioned market share, product performance, productivity and number of employees. The findings are similar to those of Murphy et al. (1996) and, Chandler & Hanks (1993) in the United States. All the firms measured growth in sales while eleven of them also used profit as a measure. Although previous literature has emphasized employment growth in evaluating high-growth businesses, this measure was not popular among the firms interviewed. While this industry capitalises on human intellectual abilities to serve technology needs, it does not require intensive labour to accomplish the work, therefore these firms were less concerned about employment growth than sales performance which they tracked constantly.

Profit is also an important performance measure because it relates to the firms' survival. Profit is usually used to fund the next phase of growth, such as product and

market expansion. In some situations financial requirements can be greater than the profit generated and therefore the firm can face losses in its high-growth period. Two firms in New Zealand (from sustained and non-sustained categories respectively) faced such experiences. A Director from one of the firms commented:

> *Definitely not and that's one thing that's easy to do is confuse growth and revenue growth with growth of profitability. In 2007, we experienced significant growth in terms of headcount and revenue, but that had a negative impact on our profitability.*

Another CEO further explained their firm's growth-profit relationship:

> *So when we won the Deloitte awards many years ago there were some very high revenues but with very low profit margin. We were doing on text messaging. Whereas now revenue is lower but we are making more money than we were. We make more profit on the work we do now.*

Ten of the sixteen firms interviewed did not agree that high growth would generate high profit. It was noted that sufficient profit was required to fund the next phase of growth.

Based on the findings from these interviews, six important characteristics were found:

a) They are founded by teams
b) The team have relevant technology or related industry experiences
c) The firms are small and medium enterprises.
d) Sales performance is an important measure of growth but sufficient profitability is critical to achieve fast growth
e) There is a distinct difference between the two countries, with more founder-managed firms in Malaysia than in New Zealand.

### 4.3 Sources, Resources and Capabilities

This section discusses sources, resources and capabilities found in the high-growing technology-based firms and how these concepts relate to one another. When the CEOs

shared their experiences about the growth of their firms, it was found that the resources and capabilities owned by the firms had a great influence on performance. Penrose (1959) points to a direct relationship between a firm's resources and its growth. Therefore, it is important to examine the critical resources and capabilities for growth. The areas which are thought to be significant for the technology industry include: government support, external relationships/networks, resources dynamism, human resources and capability, organisational capability, marketing capability, innovation capability and financial capability. With reference to Appendix D and E, no significant difference was found between sustained and non-sustained high growers in their interactions in these dimensions. Similarly, there is little diversity between the two countries except in the area of government support.

### *4.3.1 Resources Dynamism*

This study assumes that the high-growing technology-based firms have achieved sustained competitive advantage which allows them to grow more efficiently than other players over a period of time, hence they can capture a bigger market share and greater profitability and so win award ranking. Building on the dynamic capabilities concept which was coined by Teece et al. (1997) and Teece (2009), it appears that these high-growth technology-based firms have the ability to integrate, build and reconcile internal and external resources to advantage. This capability is observed through an evolutionary path. The concept of resources dynamism has been based on the interviews in this study and is similar to the dynamic capabilities defined by Wang & Ahmed (2007) who considered dynamic capabilities could influence long-term performance through capability development and business strategy.

Half of these firms had successfully managed their competencies in human capital and innovation. Resource sharing usually occurred between departments, although in one instance manpower was shared between business units. There were also situations where firms modified or extended their product, technology or human capital to fulfil a new need in the market. For example, when Future Screen was first established in New Zealand their touch-screen technology was used only in games and point-of-sales applications. It has since been extended and modified to many other types of application. It was applied to kiosk, desktop computer and large format displays and now they are moving to gesture and 3D applications. Future Screen has dynamically

extended its product capabilities with continuous innovation efforts, and therefore they are able to expand market capability. The CEO explained:

> *They've already got experience of fusing different technologies and they're probably happy with those, so we've tended to go for the new markets or markets with inflection points that are driving touch for the first time or increased option of touch so that makes it easier for us to engage.*

In addition, the firm acquired new resources such as personnel and machinery capable of mass-manufacturing its latest invention. Another CEO talked of the firm's resource extension plan:

> *We do yes. We're going to move. We're moving away from purely services to product development and to reselling products as well. So that will afford us a chance to grow revenue and grow profitability without having to grow headcount or grow significant cost in the business as well.*

One of the case study firms in Malaysia also modified its competencies during the growth period in response to market feedback:

> *We would set up the screens for them and there still we would sell the ad space to get back some revenue sharing. That didn't quite work out. We had a few trial runs in some places and it didn't work out well, so we decided since we had the solution and we know roughly how to present them, we remodel ourselves into the purely service provider perspective which made us slightly different because the whole world, as far as we know, there is not many providers like what we do. People don't pay us for a service. They kind of expect it is going to be free and you sell the ad space. But that model didn't quite work out in Malaysia that well. There was not much exposure for it. So when we remodelled the business by selling adverts solutions to banks, it brought in much success.*

There are also examples of firms involved in acquisitions activities, as discussed in Section 4.4.3, as a way to generate more resources for future growth.

The decision to act dynamically using existing resources was strongly governed by top management. Although employees were encouraged to be involved in building the firm's capabilities, the majority of firms did not cite examples of employees' involvement in the process. However, one firm in Malaysia gave its employees authority over the solution model, and the employees made the decision to migrate their solutions to a new technology. As a result, the firm put tremendous effort into the migration and is very positive about the growth outcome. This section reveals that some of the high-growing technology-based firms were able to share; modify and extend their resources during the growth period. These activities indicate resources dynamism evolving around the growth period. Therefore it is important that technology-based firms should continue to use their resources dynamically in order to develop their capabilities and achieve the growth performance they want.

### *4.3.2 Government Policies*

In this study, the role of government comprised technology policies, political stability and the legal environment faced by the two countries. Generally, both New Zealand and Malaysia governments provided political stability throughout the establishment and growth of the technology industry. Both have similar legislative systems which are strongly influenced by their British colonial history. As discussed in Chapter 1, the two countries encourage growth through different technology policies and the results of these policy differences were apparent from the interviews. As well as acquiring and sharing internal resources, most of the firms interviewed received government assistance in the form of monetary help and advice, both considered valuable resources for growth.

Malaysia government has a 'one size fits it all' incentive policy for all technology-based firms. All of the Malaysian firms interviewed were granted tax exemptions as part of the government's technology policy but only one of them had been granted research and development funds. Some Malaysian firms received advice on international expansion and one firm enjoyed a subsidy because it employed a university intern. One of the firms also received a government grant to run a marketing campaign for its new innovation. Though the government allocated substantial funds for developing the information, communication and technology sector, many of the high growers did not receive direct help with their innovation activities. Only one firm

was given a research and development grant. Three firms mentioned the limited support available from the government when using local vendors. As one interviewee commented:

> *One thing I feel upset about Malaysia government is, especially government organisations, they don't want to use Malaysian products. They would rather pay high price to overseas vendors. When we sell our products to foreign government agencies, some of them wondered why we could not get our government as users.*

It is clear that the firms that were interviewed look forward to more direct and effective support from the Malaysian government. Because of the lack of generic technology incentives, many of the Malaysian firms could not find sufficient funding to support their innovation activities. Therefore some of them opted for public share offerings to overcome their financial constraints. This lack of research grants for new technology also affects the abilities of Malaysian high-growth firms to create an impact. Many of their innovations are used only locally or in Asia.

On the other hand, the New Zealand government provided direct assistance to several of the firms interviewed. Although the country has no tax exemptions or credits for technology-based firms, New Zealand Trade and Enterprise provided business advice and was involved in the international expansion of six of the firms interviewed. In addition, the Foundation for Research Science and Technology provided significant grants to four firms. One sustained high-growth technology-based firm in New Zealand which was ranked for four consecutive years credited its performance to the role played by government:

> *They're always been very supportive both financially and with resources and then with FRST with grants. So yes, those two organisations have been very involved.*

The government not only helped to develop the innovation and marketing capabilities of these firms but also assisted in building their human resources capability by allowing one of the firms to recruit technical expertise from overseas. The CEO said:

*When we got to first manufacturing, when we got our first contract, we had to learn about contract manufacturing very quickly. We got an FRST again, called TIF Grant (Technology for Industry Fellowship Grant) to hire somebody who could help us do this.*

However, three firms did not receive any help from government. One of these firms commented that:

*I think government could play a more effective and more active role in growth of high tech and high growing firms. I think unfortunately, if you look at all the high growth that is going on across the industry, you'll probably find that a lot of that is actually driven by individuals in the private sector and not necessarily by government, which is really sad.*

The New Zealand government seems to have adopted a very selective policy in their funding allocation. This is consistent with a study conducted by Frederick & Monsen (2011), who comment that the New Zealand rate of selectivity in choosing grant recipients is the highest in the world. The three firms that were left out are not involved in new technology generation nor international expansion. The New Zealand government provides direct support through finance or resources only to those firms that meet its criteria for innovation, export orientation, productivity and growth potential (NZ Business 2011). However there were fruitful results from these performance-based incentives. The three New Zealand firms (all sustained high growers) that received government research grants successfully sold their innovations in worldwide markets, including the United States which is the innovation hub of the world. One of the New Zealand firms showing such potential was acquired by a Canadian technology giant while another firm was acquired by an Australian public listed company.

From these responses it is obvious that government has a critical role in promoting innovation activities for technology-based firms. Though different government policies create different growth performance and responses, governments in both countries have undeniably provided some firms with the resources they need to develop their capabilities. Since innovation strategy is imperative for survival in this highly volatile

industry, direct support from government is very important. The different approaches between New Zealand and Malaysia in offering incentives resulted in diverse responses from the firms involved. A selective performance-based policy seemed to generate better innovation and attract wider recognition, but made some firms feel deprived. On the other hand, a generic policy that provided tax exemptions to all players in the industry could not support innovation initiatives sufficiently. This government context could only apply to this particular group of countries.

### *4.3.3 External relationships/networks*

Several firms were also involved in industry affiliations to extend their network relationships. These affiliations were with local and global industry players. Some of the firms hoped such relationships would provide useful insights into opportunities for collaboration. One CEO stressed the importance and effectiveness of affiliations.

> *Profile is important. So being seen to be involved, or committing to, or helping out some of these is very important. Sometimes clients will look to see what sort of advocacy you have in the market and so clients, in some cases, would expect that you would be part of certain forums. But I would suggest the value of many of these forums is limited.*

Another form of networking comes from the relationships between suppliers and resellers. As most of the firms are involved in software and internet sectors, only five firms place a big emphasis on supplier relationships. Their suppliers are contract manufacture and hardware suppliers. One of the CEOs in New Zealand talked about this relationship:

> *There are our contract manufacturers. So this is mainly in Thailand and China and a firm in Malaysia. So they're very important relationships to us. We're always driving down their costs to us while maintaining the relationships really.*

Contract manufacturers play significant roles in product cost structures and also in confidentiality over innovations. There is the risk of contract manufactures copying and rebranding firm's innovation, as commonly happens in some Asian countries. For this reason proper agreements and good relationships are critical. For firms that develop

software and then require hardware to build solutions, hardware suppliers are key players in the delivery of the product. One of the CEOs in Malaysia said:

> *Yes. We have strategic partnership with basically some of our suppliers and some of the firms. It's more friend kind of where we rely on their help for local support. We have a partner there that can assist us. They're a new firm pretty much and they also do fabrication of equipment out of their structures*.

These comments show that suppliers have a big influence on cost structures, solution delivery and innovation protection, therefore trust and long term partnerships are critical in handling this relationship. All the firms interviewed, except one in Malaysia, rely on resellers to sell their solutions or products so the reseller role becomes especially important in new market expansion. Such expansions include new geographical markets, customer segments or product categories. An example was given by a CEO in New Zealand:

> *We have contacts in Australia. When these agencies come out to bid for a system, or they want to purchase a system, typically they contact the providers. For example, Adelaide have just sent out a request for information because they're about to go for tender, so that's when we can get engaged with them.*

Though selling direct to customers would be a more profitable delivery channel, these high-growth firms recognise the costs involved in generating new customer bases in new markets, therefore many are willing to share the profit from deals with resellers.

The interviews also showed that Malaysian high growers have more opportunities to work with external partners or stakeholders. All the Malaysian firms interviewed, regardless of the nature and size of their businesses, were involved in some form of collaboration such as new product testing, new technology development, new solutions development, solutions partnership for a project, outsourcing work and market alliances. Such partnerships are not limited to local initiatives but have expanded to regional collaboration. One of the firms that received the award for more than two consecutive years had a business partnership with Intel in their United States research centre and with SK Telecom from South Korea. The interviewee spoke about the

collaboration:

> *SK Telecom, for instance, we actually have two SK Telecom staff based here. One is Chief Strategy Officer. The other one is reporting to him basically. They are involved in our day-to-day operations and not only that, we have teams flying in and out of Korea and Malaysia going to learn in Korea and their teams coming to assist on projects.*

On the other hand, three of the New Zealand firms had no collaboration with external partners and their development activities were solely in-house. This could be due to the size and nature of their businesses; however the other five did have collaboration and knowledge transfer with business partners including Google and Microsoft. One of the interviewees explained:

> *Certainly from Google. So particularly the consulting team are constantly in touch with Google and because of the leadership position we have, Google even brings stuff to us first either under embargo or as a test or something to get our guys' advice as to how do you think this will work, well let's try it with a client or something like that.*

This external relationship is very important to New Zealand firms because it is a gateway for their international expansion and promotes their reputations in the worldwide technology arena. This finding is very similar to that of Mohannak (2007) in his study of Australian small and medium technology enterprises.

### *4.3.4 Human Resources and Capability*

Human capital is a critical resource for technology-based firms and it is a great challenge to find the right staff and retain them for the long term. This section discusses the importance of human capital as one of the critical resources and capabilities of technology-based firms. Human capital can be considered as a resource that determines the firm's ability to build up capabilities for its strategies. Several of the firms interviewed attribute their success to having skilled, talented and competent management staff. Obviously this group of firms invests huge amounts of effort

implementing effective human resources practices in order to build up their staff capabilities.

Getting the right personnel is one way to acquire resources that fill the firm's needs, so recruitment practices are very important. The interviews revealed that eight firms used recruitment agencies for most of their key positions while six depended on self-recruitment which includes employee referral programmes (used by four firms), printed and online job advertisements. The reason for using recruitment agencies was that some firms did not have dedicated personnel to carry out cost-effective and convenient recruitment processes. One of the CEOs said:

> *We tend to get a recruitment professional that knows our firm, knows our values, knows our culture and can try and identify people who will fit in with that.*

They also deal with international recruitment agencies, as another CEO explained:

> *We work with recruitment people. We work with the individual online agencies in a number of different countries.*

On the other hand, firms that relied on self-recruitment found it less effective to use recruitment agencies. One CEO commented:

> *We have used recruitment firms in the past and they have never been any good.*

> Another had a similar opinion:

> *We will avoid using recruitment firms where we possibly can because it doesn't necessarily deliver a better outcome and it can come at quite a heavy price in terms of recruitment.*

This group of firms therefore prefers to self-recruit and the whole recruitment process is conducted with a high level of top management involvement. One of the Malaysian firms had the CEO sit in on the selection panel for every position. This CEO was very concerned with getting the most suitable person to join his organisation. The employee

referral program is another popular technique for self-recruitment. One firm that strongly encourages this practice put up a recommendation fee of NZD 1000 for employees who manage to get new talent into the firm. The study also shows that several Malaysian firms have strong links with local universities and use graduate employment schemes as recruiting tools. These firms usually took university students as interns during their semester holidays and would offer permanent positions to suitable candidates.

The high-growth firms use several principles during the recruitment process. The first criterion is having the relevant skills and professional qualifications. Secondly, these firms try to encourage diversity at workplace by recruiting staff with from multicultural backgrounds and international experience. Two of the New Zealand firms had stringent recruitment processes, as explained by one CEO:

> *When you've had your interview you have to have a Police report. Then you have to go through a training session on the security policy and the information management systems. At that point in time you can be employed but then you have to go through another screening process before you are allowed to actually sit down at your desk and have an email and all of those sorts of things which a firm email. So it's actually quite rigorous.*

Another firm was more concerned with its employees' attitudes and intelligence, the CEO said:

> *IQ test people and we have a work profile attitude survey that we use as well. So we're trying to make sure as much as we can we get the people that fit better with our culture, they have an IQ of more than 120 and they've done a related discipline and then we invest in them. In terms of culture is I mentioned that profiling tool. So we always use that. Even though we can do it very quickly we have quite a rigorous recruitment process.*

After recruiting the candidate to the firm, it is important to provide appropriate training and remuneration in order to retain them. It was apparent from the interviews that the training provided is more skill-oriented and is usually conducted internally. This is

because the required skills might not be available at any training centre, and there is usually external collaboration with business partners to provide in-house training from their staff. One CEO said:

> *we can't go to market and find standard training courses for the sorts of things we are doing because we're pushing and leading the market in that regard.*

There was one firm that relied on its partner for training, the CEO said:

> *So we are reliant on a lot of direct training with Microsoft. In some cases, sitting in training exercises with Microsoft staff as well.*

Another CEO emphasised on-the-job training in his firm:

> *We don't send them outside. If you gave a book or sign up for training it is of no use. They must do the thing. They must do the job. So we will throw them at the deep end. When they do the programming, the new staff we take them on the client side to do live conversion all that. That is the only way to learn. So our training is very much very hands on part of the job training.*

Most of the firms interviewed revealed that their remuneration practices are performance oriented. Most of their staff have to manage their own key performance indicators (KPI). Their rewards are based on their KPI and not on their seniority in the firm, as one CEO explained:

> *So I guess the other thing that we foster here is not about length of time; it's about actually how good you at your job and if you're good at your job, you'll move on and you'll get the rewards for that. We don't really micro manage people.*

Thus staffs are encouraged to work independently on the goals that they have set and they are rewarded at the end of each year. Two firms had staff profit-sharing structures. Their staff would be given additional incentives if the firm performed well. One CEO explained this:

*Yes. In this one heart philosophy it says that [this is our firm]. What it means is that we work together, we discuss together, we have our responsibilities, share experiences together. By the way, the firm shares the profits with employees. So we allocate overall about 30% profits that we share. So while the employee must achieve their KPI.*

With effective remuneration structures, only two firms experienced staff turnover rates that were higher than the industry standard. Most of the CEOs agreed that they had reasonable staff turnover every year, which they saw as desirable to foster future growth. They believed this would help to bring in new staff and new ideas if some of the present staff had reached career bottlenecks in their organisations. As one CEO pointed out:

*Saying that doesn't mean that I'm quite a hard person. But it's required by the firm. That's why we say we require a 20% turnover. You keep it lower than that, you are in trouble. Of course higher than that, you are in trouble as well. A healthy level is around 20% and we try to keep it in that range.*

During the growth process, all these firms faced great challenges in getting the right people. The technology industry needs knowledge workers with relevant skills in order to deliver solutions. Although both countries started their technology innovation more than 20 years ago, they are still in great need of skilled and experienced knowledge workers. Many of the firms are considered to be pioneers in their particular business sectors and they find it hard to get people with the required skills. For example, Alpha Pulse faced great difficulties in getting qualified people while it was expanding into the Australian market, and as a result the firm sacrificed some of its market dominance in New Zealand.

Apart from the technical skill required, Inflame raised another human capital issue.

*There was challenge around sort of human resource. So as we got bigger, putting people into sort of more management type roles that hadn't had the experience of managing or developing teams caused us some problems. So we had to start*

*looking at a more experienced and in some ways more expensive staff to come in and help us to achieve that growth and so we obviously had to fund that.*

This challenge also persists in Malaysia where many CEOs said they had difficulty in recruiting the right staff. Human capital is considered to provide the greatest challenge and consequence for high-growth technology-based firms in both countries. Even where they do not need a large number of employees to deliver their business solutions; they do need highly skilled knowledge workers. The skill sets required include technical and management skills.

From the above discussions, it seems there was no universally-accepted recruitment channel. High-growing technology-based firms used many different ways to get hold of the people they want and need. Staff development was most commonly provided through skill-oriented internal training. Most firms were happy with their current staff turnover rates. As this group of firms were high-growing performers there was a constant need to recruiting knowledge talent into the firm. They understood that the cost of getting new staff was much higher than the cost of retaining existing staff and therefore they were willing to offer performance-oriented remuneration to keep the best talent. However, it was obvious in some of the firms that lack of human capital could constrain business growth. It can be concluded that high growing technology-based firms need to constantly improve their human resource capabilities for sustained growth performance.

### *4.3.5 Organisational Capability*

All of the CEOs interviewed sat on the top management boards with their functional managers. Some publicly-listed companies had external advisors or executives invited on to their management boards. Only one firm applied a flat hierarchical structure where all the programmers were considered to be top management. The roles of top management, as explained by the CEOs, include providing the firm with motivation and direction, strategy development, constant reviews and monitoring of progress, frequent strategic planning meetings and ensuring agreement across the firm. One CEO said in regard to the role of top management:

*I'm not sure if it encourages the growth, but we're all trying to encourage the growth. We've got a good team. The team works together well. I think it is that the Group really positions itself for growth.*

In firms that had several overseas offices, technology was used effectively in the management role. For example, one CEO said:

*When they meet up, they use things like Skype. The things like video conference and that. So you a cohesive, if you like, group of four top senior management and we work with all of the different. Managers in the different firm or countries and from time-to-time you end they go backwards and forwards. So yes, they all meet up. They all know each other and have all worked together through the growth of the firm.*

It is evident that top management has a great deal of autonomy in a firm's major decision-making of firm.

Only one firm was found not to have had any vision statement since it was established. The CEO explained:

*It's such a fast changing. I don't think a five year vision would last six months in this place. So what we do is once a year in February we look at the year from June onwards.*

The initial vision statements of the other firms were generally broad in scope and limited to local markets. However there were changes during their growth periods. Later vision statements were more global oriented (e.g. *Our vision has solely been to be the pre-eminent supplier of small site network management solutions in the world. So it always has been the same and we all still work towards that goal),* product oriented (e.g. *it is we want to be on every desktop and every wall.*), business philosophy-centred (e.g. *to be the System and Outsourcer of Choice in Portfolio Management and a Respected Innovator*), and value oriented (e.g. *Professional partnership with integrity*). Such visions clearly demonstrate aspirations to be pro-active and competitive in the industry. In order to live up to their firms' visions, most CEOs said that they often

communicated these aspirations in daily conversation with staff. One CEO said:

> *I don't know. I think I have a choice but media broadcasting it. I just play them all over, over again every day, every time.*

In addition these firms try to bring their visions alive by organising inductions, meetings and social functions. In one case, employees were involved in writing up the vision themselves to create a sense of ownership.

Technology-based firms are usually perceived to have relaxed cultures in order to nurture creativity and innovation. This study found such perceptions to be consistent with the evidence. The interviews revealed that the sixteen high-growth technology-based firms were highly people-driven, relaxed and innovation-oriented in their corporate cultures. As one CEO said:

> *We have a very relaxed internet surfing policy. We have a fairly relaxed clothing policy. The main thing for us is that the job gets done and gets done to the standard that we want. That is the primary thing.*

And another CEO said:

> *The four cornerstones really are creativity, integrity, quality and precision and dynamism. Each of those things has got words in behind them that means we try to get things that were specific to us.*

Flexibility is allowed in the working environment, as one CEO explained:

> *We are quite flexible there. We don't babysit people. So we don't have to fill in timesheets exactly or check-in or ask if you can go, so we allow people to be able to manage their own time.*

During the interviews, business cultures were variously described as business purpose-driven, agile, value-driven, efficient and customer-oriented.

Summing up, there are a few major observations that can be made about organisational capability. First of all, top management provides the macro-directions of a firm while encouraging self-management by staff. Secondly, visions usually change as a result of growth opportunities. Finally, high-growth technology-based firms have relaxed, people-driven corporation cultures that encourage innovation, risk taking and pro-activeness for sustained growth. It was observed that the firms interviewed had strong organisational capabilities and entrepreneurial orientation (Lumpkin & Dess 2001) that could influence growth performance.

### *4.3.6 Marketing Capabilities*

Thirteen of the firms interviewed confessed there was little emphasis in marketing activities in their firms. As they were selling to other businesses which relied on one-to-one relationships, broad media advertising and marketing had little effect on their activities. The marketing communication channel most frequently used was publicity. Many of them released their latest innovations and business developments online or via printed media. Six firms used websites and blogs extensively to update what their businesses had to offer. Their participation in the Deloitte Asia Pacific Fast 500 Ranking also helped to publicise their reputations in the industry. One of the CEOs said:

> *Again, we are having a great year so our thinking is part of our advertising strategy really was to entering awards. Through that we've had so many people come and talk to us and do stuff and the TV. It's really part of our marketing strategy is to enter into Deloitte awards.*

Most thought that referral sales or word-of-mouth endorsements from satisfied customers were better marketing tools for creating new sales. However, three firms believed in the importance of marketing to promote corporate brand and image. One of these firms was in the process of moving towards a different market segment with a new innovation. This firm originally sold telecommunications solutions to corporate customers and was extremely successful in its overseas ventures. In year 2009, they were given a licence to operate Wi-Max, a high speed mobile internet service for Malaysian consumers. Since then this firm has spent a massive amount in billboards,

printed and online media advertising to public consumers in order to define its new position in the market.

As well as using the methods mentioned above, two firms participated in trade shows and conferences to share their innovations and learn from others. Four firms purchased market research reports from professional companies in order to better understand their markets. Based on these marketing efforts, many of interviewees perceived their firm's image to be that of a highly professional, easy to deal with and innovative business. Some heard this reflected by their customers and competitors. As one Malaysian CEO said:

> *They perceive us as very innovative, always come out with new product. I hear in the market that a lot of things we can do.*

A New Zealand CEO said similarly*:*

> *…..but they also see us as a relatively accommodating and fair service provider and an organisation that is relatively innovative too in the way that it approaches its stuff.*

Several firms considered themselves as dynamic, niche providers with quality products. This shows that even high-growth technology-based firms put limited effort into marketing activities, but they are able to create positive images in their customers' eyes. They successfully chose the right marketing channel for their current market segment, therefore effectively positioning themselves in this highly competitive industry.

The interviews also reveal that all of the firms studied were selling to organisations. Their customers include other businesses, system integrators and governments. This business-to-business model is similar to those found among high-growth firms in Scotland (Mason & Brown 2010) and Australia (Tan 2007). Only one firm in the study sold direct to consumers. This was an online hardware retailer that sold to businesses, government and also the general public. Most of the firms sold locally as well as globally, and had a good mix of local and global customers to ensure continuous

growth. One New Zealand firm sold only to the global market and its customers were personal computer manufacturers. The CEO explained:

> *We hardly sell anything inside New Zealand. Our customers, they're global brand manufacturers. The people like Hewlett Packard or Dell or Sony, people here in New Zealand wouldn't even know that their products are using our technology.*

On the other hand, five firms sold only to local customers at the time they were interviewed, although they indicated their desires to sell globally through resellers or business partners. Their customer profiles show that these high-growth firm have worked hard to expand their customer base.

Customers play a few key roles in building the marketing capability of this group of firms. Many interviewees mentioned referral sales from customers which led to new sales opportunities. As one CEO commented:

> *We get a lot of referral business and probably half of our leads are someone said something to somebody about, or the clients themselves, particularly in Australia, we used to be number one.*

Another CEO spoke similarly: .

> *...because they're always recommending. So when you talk about the whole customer base, they're recommenders, they're purchasers, they are certifiers.*

With a business-to-business sales model, referral sales through customer word-of-mouth were much more important than any marketing tool for the firms interviewed. Referral sales successfully helped them to expand their customer base and fuel business growth. Another key role mentioned by some firms was their customers' involvement in the innovation process. Nine firms talked about receiving product feedback from customers. This feedback was used in product improvement, as one CEO explained:

*.....we're getting this sort of feedback from customers and then feeding that back into the next generation product or fixes to this generation product*

It could also provide the blueprint for a new product idea, another CEO said:

*Maybe in the way that we listen to their needs so that we can determine our product road map. So there's this many things that we could do, want to do, but we have to focus on the ones that will make us money first. We'll listen to our customers' needs and that will help us determine what we do develop on the road map based on what they want to pay for.*

Other customer roles mentioned were partnership in a sales opportunity and providing entry barriers to new competitors. Strong support from a customer could eventually lead to a long term partnership especially if the solution was applied to another subsidiary of the firm. Furthermore, a customer's recognition and endorsement could reduce competition from other industry players.

The importance of the customer in promoting sustained growth encouraged these technology-based firms to make many efforts to maintain good customer relationship. Many emphasised constant communication with their customers by appointing a key account executive to provide comprehensive support and service. One CEO said:

*We have a Customer Relationship Manager. So they're responsible for meeting with and having conversations with a customer on an ongoing basis to get feedback about the product and their use of it and the stickiness and any problems and providing training for those customers.*

Some had taken proactive initiatives in providing expertise and informational services to their customers. A CEO from New Zealand said:

*We're very proactive with our Tier One customers about helping drive new ideas, new initiatives. So if we can understand their strategy, we come back and present back ways of using technology to help support or enable these strategies.*

Another firm implemented a system to manage this relationship:

> *We have massive CRM systems and we have ongoing meetings and we have emails going every direction.*

Four firms mentioned efforts to provide complementary products or services to their customers while another three worked towards constant improvement of their products. By offering more value-added services to their customers, the high-growth technology-based firms enjoyed better long-term relationships with them. As a result, the cost of getting new customers was tremendously reduced, as one of the CEOs explained:

> *The cost of acquisition of new customers is expensive compared to if you look after someone you can keep selling new benefits to them. So they play a very important role to help us sustain that growth as well as a good customer will tend to tell 10 other people.*

Though the firms interviewed did not run extensive marketing campaigns, their marketing capability was strongly influenced by their customers. They made constant efforts to reach out to their customers. These firms designed and implemented strategic marketing plans that targeted their direct customers. With a business-to-business model, major customers are a source of growth through bringing new business leads and advising of new product development. Many of the firms interviewed have successfully expanded their customer bases by exploiting these opportunities. This marketing capability is imperative in the market expansion strategy explained in the strategy section.

### *4.3.7 Innovation Capability*

Innovation is the major strategy used by high-growth technology-based firms to sustain growth, and the interviewees reported extensive initiatives to spearhead innovation ideas. First, they deployed staffs into research and development activities. The number of staff involved ranged from 2 to more than 70, depending on the size of the firm. The founders were usually involved in research and development activities as well as juggling with other aspects of the business during the initial start-up. Many had

recruited new staff to take on research and development full time once the business grew. One CEO mentioned that:

> *It was only two years ago that we split research off from development, so now we've got research with its own team and that's built up to about seven or eight people now and development is up to 60 or 70 people, so it's a big investment, big growing investment in research and development*.

This change was noticeable in the majority of the firms which had needed additional staff to pick up new skills and technology in the marketplace. This had indirectly increased the investment they needed for research and development.

The second initiative was setting up knowledge management systems within the firm. Twelve firms had comprehensive online documentation on their products, solutions and services. This helped to provide training for new staff and reduce problems during project handover or when staff left the organisation, as well as safeguarding the intellectual property of the firm. The most common knowledge management system in New Zealand is Wiki. One of the CEOs said:

> *We have Wiki. We have a number of Wikis, but we have Alpha Pulse Wiki and the Alpha Pulse Wiki is a Group Wiki as well even though it was started here. Then we try and process it by stuff as early as we can as well so that it can easily be taken by another consultant or another region and deployed there too without too much double handling.*

Other tools include system manuals, document management, library systems and standard operating procedures. Most of the firms in Malaysia use system manuals to keep track of their projects. There was a feeling that more effort could be put in to knowledge management. As one CEO said:

> *I wouldn't say that we have a structured knowledge management system in place. It's more of an unstructured where the knowledge base systems are kept in our SOP files. It's like an SOP. So that is where it is really shared actually to all the*

*new employees. But other than that, no, we are still lacking in that part. That can be improved definitely.*

Original ideas and creative thinking are very important generators of new innovation for technology-based firms. Eleven of the firms interviews showed their appreciation of ideas from staff. They nurtured open, relaxed and unstructured environments to encourage idea-sharing any time and with anyone. One Malaysian interviewee said his firm created a unique platform for staff to share ideas:

*There are platforms available. I say one of it is CEO immunity card. As soon as you join the organisation you get three free passes where you can make any mistakes in your career and just take a risk, issue the card and say I won't be penalised because I have got the CEO's immunity card. So we are trying to make people think differently because we know it's the cutting edge. Then the other thing is we have an idea platform where if you have an idea you just send it to the idea platform and then it will be considered for implementation.*

Monetary and non-monetary rewards were also used to foster this culture. One CEO explained:

*Well, we reward patent. So if people file patents then they can be rewarded for that. If the patents get granted they get rewarded for that. But we also have kind of informal awards that recognise new ideas.*

These technology-based firms spend huge amounts of money on research and development every year. The amount they spend depends on the size of the firm and the nature of the innovation. The highest expenditure was found in a New Zealand firm which spent $3.7million on their latest new product development. This investment was channelled through staffing costs, software and hardware acquisition, running a research centre and the process of developing and marketing the new innovation. In several instances, technology-based firms invited their partners and external relationships/networks to collaborate in research and development processes which are discussed in Section 4.3.3. These technology-based firms put a lot of effort into

pursuing innovation strategy, and as a result many new technologies and innovations were introduced. One Malaysian firm said*:*

> *I would say it is good, but over the time since we launched in 2008 there has been a lot of learning of the technology. Because even when Malaysia awarded WiMAX spectrum on the 2.6ghz band, which is what we are on, I think we were the first in Asia Pacific and among pioneers in the world. So we had to figure out the launching of the technology, about the network architecture, design and about the best solutions to compliment the technology etc.*

A New Zealand CEO said:

> *We developed the first mobile application for Microsoft Windows 7 in New Zealand. That was the first application to be submitted to the global market place and get approved.*

Because it is costly to develop new technology or new products, some firms chose to encourage resource sharing through research collaboration. This is explained in the external relationships/networks discussion in Section 4.3.3.

Another initiative which built up innovation capability was the consistent organisational emphasis on innovation and product development. A Malaysian firm explained how they extend these initiatives to their customers:

> *Particularly we have meetings sitting down there with customers in a team and they bring a topic and they talk and they will ask and we test them out with ideas.*

Another firm linked the firm's culture with innovation:

> *The firm signature is Innovation. This is the firm natural genetic. We aggressive look out to improve process and solve problems. We were rated the most innovative SME in the country.*

From the discussion on innovation capability, it is obvious that high-growth technology-based firms put their greatest efforts towards supporting innovation strategies. They constantly invest in building up technology and innovation resources regardless of their product or business cycles.

### *4.3.8 Financial Capability*

The last capability emerging from the interviews is financial capability. As mentioned earlier, technology-based firms require substantial funding to invest in research and development activities. Therefore it is important that they manage their financial resources adequately. Most of the interviewees had limited backgrounds in accounting and finance but they realised the need to have good control of their finances in order to grow their business. One of the ways they developed their financial capability was by engaging external advisors, especially from accounting and tax services. In addition, nine firms appointed board or non-board advisors to watch over their financial performance. These roles are more important in firms that are in public ownership, are being acquired by others, receive venture capital or are expanding internationally. Such changes require professional advice especially in financial issues. One of the CEOs explained:

> *They've assisted us in the incorporation of different firms in the United States to do that in a most efficient manner for New Zealand. General funding and all the likes.*

Another commented:

> *We have our financial advisor as well that helps us to advise us on our next move in terms of corporate restructuring, in terms of our business direction.*

Financial capability has a great impact on strategy implementation. Many high-growth firms adopt product innovation and market expansion strategies that require huge amounts of investment. In most cases there is no immediate return on investment so without continuous monitoring of cost and capital, the business would not be able to sustain its growth for long periods of time. As most of these firms are small-medium

enterprises that often face financial constraints, their ability to manage finances becomes more critical.

***Hypotheses Development***

There was no significant difference in the sources, resources and capabilities of technology-based firms in New Zealand and Malaysia, nor between the sustained and non-sustained groups. It appears that these sixteen firms all had similar resources for growth. Their main resources were management and staffs, as well as support from government and external relationships/networks. It is apparent that the firms interviewed had dynamically extended, acquired, and modified their resources to develop suitable capabilities for growth. Therefore it can be concluded that their ability to use resources dynamically depends on the support received from government and external relationships/networks as well as their own human resources. It is also noted that the more resources that they have, the more they are able to develop the capabilities needed for growth. The hypotheses developed are:

*H1a: Government policies influence technology-based firms' ability to use resources dynamically (resources dynamism).*

*H1b: Human resources influence technology-based firms' ability to use resources dynamically (resources dynamism).*

*H1c: External relationships/networks influence technology-based firms' ability to use resources dynamically (resources dynamism).*

*H2a: Government policies are related positively to the capabilities of technology-based firms.*

*H2b: Human resources are related positively to the capabilities of technology-based firms.*

*H2c: Resources dynamism is related positively to the capabilities of technology-based firms.*

*H2d: External relationships/networks are related positively to the capabilities of technology-based firms.*

## 4.4 Growth Strategy

There are a number of studies of growth strategies used by technology-based firms (Eisenhardt & Schoonhoven 1990; Keogh & Evans 1999; Graebner 2004; Cooney 2009 and Saarenkeot et al 2009). Some of the growth-related strategies discovered focus on product and market (Fesser & Willard 1990); new market expansion (McCann 1991); organic structure and deliberate strategy (Cooney 2009) and innovation (Chen & Yuan 2007). From the interviews with New Zealand and Malaysia high-growth technology-based firms, similar strategies were found. There was no difference in the growth strategies used by sustained high growers and non-sustained high growers. A few growth strategies were mentioned frequently in the interviews.

### *4.4.1 Differentiation: Product Innovation and Niche Focus*

The interviewees explained that the technology industry was highly competitive and dynamic. In order to gain bigger market share, technology-based firms strive to offer products/services that are highly differentiated from those of their competitors. Previous research found that elements of difference include quality, price, innovation, customer service and speed. The interviews revealed that this particular group of firms differentiate their products and services through innovation. Innovation-driven differentiation was through investment in people, faster response to customers, network collaboration, and continual improvement of products and services. Quotes relating to this strategy include:

> *We found what we believed at that time were the right staff to help us achieve that and we used our brand and our track record to tap into emerging markets and we funded the development out of cash flow.*

> *Our focus and strategy right now is working with key partners.*

> *Having a very good understanding of your customers. Being responsive to your customers. Almost being simplistic, but doing things because you genuinely care about making the customer have a happy outcome and not just about selling them something. It is almost like if you take care of those small things at that level then the other stuff happens by itself automatically.*

Furthermore, four firms commented that owning intellectual property patents allowed them to have more sustainable competitive advantage than their competitors in the same sectors. One CEO said proudly:

> *So the firm only sells a broadband network management system and it has a special patent, a special communication method that we were able to patent and that particular patent makes the provision of broadband network management services incredibly efficient. So that point of difference actually having a total system as opposed to just a piece of hardware and the way it is managed is the single greatest contributing factor to all unique selling proposition for the firm.*

These high-growth technology-based firms worked tirelessly to build expertise and market leadership in their business solutions.

These efforts are apparent in the continuous technology investment and capabilities development discussed in section 4.3.7. The section outlines the many initiatives carried out by technology-based firms to build up distinct advantages for their products and services. It is important for a technology-based firm to deliver innovative solutions to their customers, especially with so many competitors targeting the same market. Innovation capability is not easily imitated by competitors and therefore can provide a temporal competitive advantage. These high-growth firms have developed their innovation capabilities through continual high investment in order to enjoy high-growth performance for a period of time. Strategies emphasising product and technology innovation are therefore imperative.

In addition, most of these firms are highly specialised and focus on the products they offer. Brand specialisation, market focus, niche solutions and outsourcing were some ways of implementing this strategy. A definite comment was given by one of the CEOs*:*

> *……we've not allowed ourselves to be I guess distracted from what we were already good at.*

They also realised the importance of being focussed in their pursuit of growth, as one CEO explained:

> *So we wanted to reduce as many competitions and we wanted to do something that we very excel on and we can be number one in that space. So it's always about identifying the space so that we can be an A of the firms that can be achieving growth.*

Another CEO talked about this differentiation approach:

> *Our agility is really important. That's also different from our competitors. So we're quite a small firm that plays in a market against traditional competitors that are four, five or 10 times the size of us and so we're able to deliver a better result and a higher quality with a lot more agility, I think that's what makes us a little bit different.*

Further comments from another CEO emphasised the importance of being specialised and niche-focussed:

> *The biggest problem with New Zealand firms trying to compete in the world is being all things to all people. You have to be exceptionally niche, exceptionally finite about what you're doing but just aware of what's going on around you in case you have to react.*

The niche-market approach requires businesses to generate the highest possible revenue and profits from a particular market. Their products or services may not be suitable for mass groups of customers, especially in the end-user market, so the niche solutions strategy brings in sales from industry markets or commercial users.

This is proven in the external environment where the business-to-business model was used by all of the firms interviewed. The study found that only one firm sold its products to end users, while the other firms dealt only with other businesses. Niche solutions and business-to-business models indicated that the firms had a limited number of customers, therefore their relationships with other businesses were very important.

Many interviewees also commented about their experiences in providing more value-added services to their customers. They worked constantly on product improvement in order to develop long-term customer relationships. Their focus on a particular segment of the industry market was also evidence of their targeted marketing approaches. They relied more heavily on direct marketing strategies than on mass advertising campaigns. With these solution and market-focussed strategies they were able to generate greater sales volumes and higher profitability. It is therefore obvious that high-growth technology-based firms use a niche-focus strategy to achieve their high-growth positions.

Based on this discussion, it appears that technology-based firms have successfully differentiated their product with innovation and niche focus. Their strategy choices are strongly influenced by their internal capabilities. Therefore, the following hypotheses have been developed:

*H3a: Internal capabilities are related positively to the product innovation strategy of technology-based firms.*

*H3b: Internal capabilities are related positively to the niche focus strategy of technology-based firms.*

*H4a: Product innovation strategy is related positively to the performance of technology-based firms.*

*H4b: Niche-focus strategy is related positively to the performance of technology-based firms.*

### *4.4.2 Market Expansion Strategy*

These technology-based firms experienced different type of growth modes throughout the growth stages. Technology solutions are usually customised and applicable to a certain group of customers, therefore there is a constant need to explore new customer bases in order to generate sustained growth. Several firms realised the connection between gaining new customers and revenue growth. The CEO from Inflame explained the growth factors in this way:

> *We were quite quick to build up a customer base and to bring in revenues, so they were positive signs that supported that strategy and kept us funding that, moving*

*that forward.*

Both Malaysia and New Zealand have limited numbers of customers available for business expansion. Because of local market constraints and regional opportunities, eleven of the firms studied had overseas ventures in the form of sales offices, foreign subsidiaries or joint ventures. The expansion of new markets is therefore considered to be an important growth strategy for technology-based firms. The type of overseas ventures is shown in Table 4-2.

**Table 4-2 Overseas Ventures**

| Firm | Form of Overseas Venture | Countries |
|---|---|---|
| Future Screen | Sales Office | Taiwan, South Korea, United States, Japan and Singapore |
| Alpha Pulse | Subsidiary | Australia |
| Mega Connection | Sales office | United Kingdom |
| The Race | Joint Venture | Brazil(pulled out), United States |
| Inflame | Subsidiary | Australia and United States |
| NZ Link | Sales Office | United States |
| B2N System | Sales Office | Vietnam, Singapore, Indonesia, Saudi Arabia |
| Mobile Pack | Subsidiary and sales office | United States, Singapore, Bahrain, China, Taiwan and Thailand |
| Secure Boundary | Sales Office and subsidiary | Brunei, Thailand, Singapore, Hong Kong, China |
| Bank Link | Subsidiary | Kuwait and Indonesia |
| Data Media | Sales Office | Vietnam, Singapore, the Philippines, Thailand and Indonesia |

***Names were changed to ensure anonymity.*

There were indications that the current non-involved firms were also ready to expand. Instead of just selling their products or solution to foreign markets, many of these high-growth firms established a stronger presence by having an overseas office. This could help them respond more quickly to customer demand. The desire to expand into overseas markets was strongly supported by external environment conditions. All the technology-based firms mentioned facing similar industry conditions of highly-competitive head-to-head rivalry with other players. Many of them capitalised on governmental support and multiple network relationships so they could enter new markets. The limited customer base of the business-to-business model was a strong incentive to employ market expansion strategies to obtain more customers. From Table 4-2, majority of the overseas markets were found in emerging Asian countries. This strategy helped to reduce the negative effects of the economy by opening growth opportunities for the technology-based firms. As well as opening new offices in other countries, five of the firms interviewed also set up offices in another city in their home

country. These were initiatives to grow their customer base in the domestic market. Most of the businesses gained bigger sales percentages from their domestic markets, with the exception of two global firms from New Zealand that sell only to overseas markets.

It is apparent that the internal capabilities of these firms supported the implementation of their market expansion strategies. As mentioned in the capabilities section, the availability of human resources, marketing channels, customer knowledge, organisational enthusiasm and innovation effort helped them outperform their competitors by gaining higher sales revenues. These sales were generated either from capturing bigger market share or expanding to a new market. It can be assumed that these capabilities were significant in helping to implement market expansion strategies. The hypotheses developed are:

*H5: Internal capabilities are related positively to the market expansion strategy of technology-based firms*

*H6: Market expansion strategy is related positively to the performance of technology-based firms.*

### *4.4.3 Public Ownership and Acquisition*

One of the greatest challenges for high-growth firms in the two countries is ensuring sufficient finance to feed the growth. This was mentioned by several CEOs including the CEO from Inflame:

> *Cash flow and funding growth, cash flow was always a challenge, particularly as a service based business.*

The CEO of The Race made a similar comment.

> *for example the unforeseen was growing too fast, like you can run out of money. It's very dangerous. I think lots of firms go under through running out of money whilst you have to strategise, know your environment, so growing without the reserves and resources to do it is very dangerous.*

The interviews revealed that many of these high-growth firms opted for initial public offering (IPO) during their growth stages. This was more apparent in the case of Malaysian firms. In Malaysia, four firms opted for initial public offering during their growth stages and they are now listed on the Malaysia Stock Exchange. Another one of the firms interviewed was currently preparing for its IPO. Only one of the New Zealand firms had been opened to public ownership. They did this to provide sufficient cash flow for overseas expansion and new product development, to promote the firm's credibility and to offer investment opportunities. One firm in Malaysia had accepted an injection of funds from venture capital. The changes in ownership through IPO and venture capital funding have similar benefits to those of acquisition but such firms have to endure stringent attention from their investors from time to time. From the discussions it appears that high-growth technology-based firms are always in need of financial resources to fund their growth, and many have to sacrifice private ownership to obtain that.

Several firms were involved in acquisition activities or experienced change of ownership during their growth stages. After the publicity from winning the Deloitte Award, two New Zealand firms were acquired by foreign public-listed technology-based firms and another one acquired a smaller development firm (which had been a business partner) in Auckland and turned it into a branch office. Another firm had an unsuccessful acquisition experience in the United Kingdom. The two firms that were acquired enjoyed greater presence in overseas markets and more financial backup. The CEO from Future Screen commented on the difficulty of getting funding for expansion but said the problem was solved when the firm was acquired two years ago:

> *We manage fund with difficulty. It's different now that we've been 100% acquired. But before then we had three rounds of private equity all of which were very painful and very difficult to achieve. We had to go into debt at one stage as well and borrowed about $2m which of course makes the balance sheet look even worse and makes raising equity even harder.*

These acquisitions resulted in changes of ownership for the two New Zealand firms. They were previously owned by individuals from New Zealand, but are now subject to another country's regulations for publicly-listed firms. On the other hand, the firm

which acquired its business partner has greater control over its business operations in Auckland. Only one Malaysian firm carried out acquisition activity to expand its product range.

From the discussion it appeared there were two reasons for public ownership and acquisition decisions. First, financial obstacles forced the privately-held firms to be acquired or opened to other investors. Secondly, the desire to have more resources and capabilities prompted technology-based firms to acquire other players in the industry. This implies that lack of capabilities was the motivation for public ownership or acquisition. In other words, remaining as a privately-owned company would hinder the firm's access to better resources and growth potential. Acquisition on the other hand encourages access to resources and promotes performance. The hypotheses developed from this are:

*H7a: Internal capabilities are related positively to the remaining-in-private-ownership strategy of technology-based firms*

*H7b: Internal capabilities are related negatively to the acquisition strategy of technology-based firms.*

*H8a: The remaining-in-private-ownership strategy is related negatively to the performance of technology-based firms.*

*H8b: Acquisition strategy is related positively to the performance of technology-based firms.*

### *4.4.4 Strategy Flexibility*

It was found that some of the firms interviewed had emergent strategies relating to the growing process. For example, Future Screen which was supplying touch kiosks in the gaming industry had switched their focus to the consumer market by offering touch screen personal computers. As the CEO explained:

> *Really strong focus on the markets that we've chosen to go after and it's not everything. The desktop market plus the large format market are the two markets.*

Though they were still very focussed on their touch screen technology, their customer focus had evolved. They identified the potential of consumer markets and formed

partnerships with Microsoft in several turnkey projects for large screen displays. Another firm that was keen to expand its markets had a turnaround strategy when it pulled out from overseas expansion and decided to change its business model. The CEO said:

> *We could have done that we would have to keep raising more money but we needed more (what's the word I'm looking for), we didn't have the platforms in place really to continue that aggressive growth. So we are in that process now of kind of turning around and going back and to do it again.*

Some of these changes were necessary because of uncertain environments such as sales performance, market changes and consumer trends. These CEOs were obviously sensitive to the environments they dealt with and were willing to embrace change. As explained in the discussion of external environment conditions, the technology industry is a fast changing marketplace with numerous players and dynamic technology developments. To overcome these uncertainties, a large amount of flexibility is needed in strategic decision-making.

The three strategies mentioned, product innovation, market expansion, public ownership and acquisitions, are essential for growth in the technology industry. Technology-based firms did not use these strategies independently or sequentially but often concurrently. For example, in the case of Future Screen they have patented touch screen technology that is used by computer manufacturers. This firm set up many overseas offices to develop closer relationships with computer manufacturers around the world. Their innovation efforts and foreign expansions required a large amount of investment so the firm agreed to acquisition by a Canadian technology-based firm. There were many similar growth experiences shared by technology-based firms in this study. This demonstrates that a certain amount of flexibility exists in high-growth technology-based firms. In order to have continuous high-growth performance, such firms must be able to capitalise on external changes and organisational resources, and also allow changes in strategy to overcome growth barriers. The ability to use suitable strategies to deal with changes in the environment is strongly influenced by the firm's internal capabilities. The following hypotheses are developed:

*H9a: Internal capabilities are related positively to the strategy flexibility of technology-based firms.*

*H9b: Strategy flexibility is related positively to the performance of technology-based firms.*

## 4.5 Growth Challenges

As this study focuses on high-growth firms in one particular industry, the climate and structure in that industry is considered to be similar apart from the government policy aspect for all the firms interviewed. It is important to note that there is no difference in this respect between sustained high-growers and non-sustained high-growers. During the interviews, many firms commented on the challenges they faced especially when dealing with external environment and growth barriers. The interaction of a firm with its environment is a strong determinant of growth performance. These firms faced a high level of environmental uncertainty that required fast response during growth periods. They were also challenged by financial constraints and human resources constraints that hindered their growth potential. This section discusses how the high-growth technology-based firms in New Zealand and Malaysia reacted to these challenges.

### *4.5.1 Competitive Industry*

The competitive environment is another aspect that influences the growth of technology-based firms. Setting up a new technology-based firm is relatively easy as the capital requirement is considered low. Many technology entrepreneurs started their own firms by using personal savings or family loans. This situation was found in several of the firms interviewed. Many of them commented on the increasing number of competitors they faced after their initial start-up. One CEO said:

> *When we started we had about three or four competitors. Now there are more than about 150 doing this?*

The huge number of technology-based firms in the industry makes for stiff competition among firms trying to achieve long term high-growth performance. From the interviews it is clear that most of the interviewed firm kept track of their competitors. Their efforts

included self-monitoring of competitors' websites, getting feedback from customers and attending industry road shows. These initiatives helped them to build better positions in the market by identifying what they could do better than their competitors. Although understanding the movements of their competitors was important, none of the firms had reacted directly to competitive pressure. This is because they are technology leaders and they have identified their points of difference in order to achieve competitive advantage in the market.

The firms interviewed have considerable understanding of their competitors and constantly try to differentiate themselves. Half the firms interviewed faced competition from global players who were unable to fill the niche needs of the market segment. Furthermore, some firms identified the limited innovation abilities of their competitors:

> *Then when the market became more Google ad words and search marketing rather than search optimisation, a whole plethora of firms came into the game there, including most of the major agencies who then offer search as part of the overall online advertising.*

A CEO in Malaysia commented that his competitors were technology followers:

> *Local players have copied us. Not the international. International players find it difficult to change it throughout the whole world. But the local players, most of them our Managers that went out and start their own. So they adopted the same strategy. In fact, the international players couldn't compete with our local Managers right now.*

Technology-based firms in Malaysia and New Zealand are in highly competitive markets. There is no regional difference among the firms in reacting to competitors. It is not easy to survive in a market with numerous players and fast changing technology. The technology industry changes faster than other industries. In order to keep up with the pace, technology-based firms have to keep moving forward to enjoy first mover advantage in the industry. Most of the firms interviewed were considered leaders in their own sectors. They were able to act faster than their direct competitors and turn the markets around with new innovation. There were simultaneous efforts to keep track of

movement within the industry. Half the firms interviewed mentioned changes in market demand. One of them said about the impact of worldwide web:

> *Everything now is driven around the web, everything is web based, and as a result a lot of the boxes that people use are just web based boxes really. People don't really use hardware to the same extent that they used to. There are a couple of changes. In the industry the way people do business online has changed a lot. There is a lot more automation, a lot more integration between us and our suppliers. Things like the processes themselves have changed a lot*.

Other CEOs talked about mobile technology:

> *I think the fact that we're a lot more mobile than we were 10 years ago has made a difference. We're not just building a website; we're building a website with a mobile component to it, or we're building for laptops or for tablets and so that's changed significantly as well*.

Two firms discussed the potential of social media and touch screen applications in the current wave of change. Internet, mobile, social media and touch applications have revolutionised software and hardware solutions in the technology industry. This creates new market demands and opportunities for growth.

### *4.5.2 External Environment Effects*

Over the last two decades, the technology industry has weathered two economic crises (one in 1997 and the other in 2008) and the dotcom bubble burst in 2000. During these periods, businesses in general reduced their technology investments in order to survive. As a result, many technology-based firms faced serious financial problems and some were forced to close down. It is therefore imperative to understand how these high-growth technology-based firms dealt with the economic environment. Since most of the firms interviewed have expanded into international markets, there were mixed outcomes in terms of national economies. Firms that had greater proportions of international business were less likely to be affected by their national economy. They saw a slowdown in local sales but this was manageable. However, the effects were very negative for firms that were dependent on local markets. One CEO explained:

*We had several months there of reduced revenues around marketing and advertising but we now see more growth in the commercial side where we focus on the business solutions as opposed to the marketing and advertising. Yes, it definitely did affect us, for about half a year at least where we were shorter on marketing sales than we thought we were.*

Another CEO commented on the effect of local business confidence on economic growth:

*we are heavily reliant on business confidence, so that's a really important indicator because that influences the spending of our private sector customers and unfortunately, the way I think business confidence is measured and reported in New Zealand can create more problems and can perpetuate issues because certain business leaders get up and say the economy is in trouble, or the recession is causing people to stop spending, that encourages less spend and it can be a self-fulfilling prophecy which I think is very, very dangerous.*

On the other hand, two firms reported gains during the national economic downturn. They were given greater opportunities to supply to multinational corporations whose budgets were being slashed.

The slowdown in the global economy has had a great impact on all the firms interviewed. Although some firms might deal only with their local markets, chain reactions from global scenarios hold back many of their projects. The common outcomes from this slowdown are a drop in sales, slower growth rate, longer time needed to close deals and more emphasis on debt collection. Due to the limited cash or funds available in the market, some of firms have had to source alternative funding to ensure their survival. Some of these alternatives were cash flow generated from previous sales, owners' personal savings, private equity, venture capital, bank loans, angel investors and public funds. The last four were especially hard to access during the downturn periods; therefore most firms relied on further injections from the shareholders or owners. It was clear from the discussions that high-growth technology-based firms cannot avoid the impact of global economic recession regardless of their market focus. Global recession is a generic problem that hinders growth in all

businesses. Sufficient cash flow or profits generated from previous growth periods are critical to helping the business get through the downturn.

Nine firms commented that there was more innovation in the industry over the last 10 years. One CEO explained the impact of this innovation on hardware supplies*:*

> *Now hardware is a consumable. It is no longer an asset. It is something that you hope to get maybe a couple of years out of and then you throw it away. So I think that sort of thing has changed quite a bit.*

This change has reformed the perception of users and thus encouraged more repeat sales opportunities for this huge investment. The frequent innovative changes also create more market demand for design-driven solutions. As a result, more firms have found niche markets in this highly competitive industry. One of the CEOs said:

> *There is definitely more of a design focus than there was 10 years ago. It was again a lot more sort of technology driven and so it was about the technical solution as opposed to the business change or the business environment that we were working in. I think that's also evolved.*

However, the changes in the industry have created more growth opportunities as well as more competition. The highly accelerated growth within the industry has attracted many newcomers. Some of these newcomers might be technology subsidiaries of conglomerates or start-ups by technology entrepreneurs. Several of the interviewees mentioned that they now faced more competition. Other noticeable changes include: price, workforce and regulatory changes and market consolidation, and some of these changes are sector-specific.

Although these high-growth technology-based firms face a highly uncertain industry with more players racing to enter the game, they all displayed great confidence during the interviews. One CEO identified great potential for growth based on his confidence in the national economy:

> *New Zealand will have to catch up at some point and it is. So we predict*

*anywhere between 15% and 30% growth each year. This year we're looking at 15% because maybe the market has been a little bit more subdued. But we're growing by more than that.*

Another CEO saw the potential of his key customers*:*

*So the potential for growth for digital signage advertising is looking a lot better this year after Big Tree has gone into this market than it was in the previous years because most of the players out there, they want to control everything.*

Others mentioned prospective growth generators such as industry growth, increased usage of broadband and mobile technology, overseas market expansion, potential from new products and new innovations. The discussion revealed that changes in the industry have created many potential growth areas for technology-based firms. There were many similar firms that faced similar situations, but not all achieved high growth positions. It is therefore evident that these technology-based firms have demonstrated their ability to embrace change and respond with clear business directions. The discussion revealed that changes in the external environment created growth opportunities as well as challenges for high-growth technology-based firms.

Based on the discussion of industry competition and external environment in these two sections, it appears that the effects are two sides of the same coin. The highly competitive environment, economic issues and ever changing industry creates a number of growth inertias as well as growth opportunities. It is difficult to determine whether the effects relate negatively or positively to performance. However it is undeniable that the external environment affects performance. The hypotheses developed are:

*H10a: Competitive industry affects the performance of technology-based firms.*
*H10b: External environment affects the performance of technology-based firms.*

### *4.5.3 Human Capital Barriers*

Human capital is another key challenge for high growing technology-based firms. As seen in Section 4.3, this group of firms realised their potential capability through

investment in people and technology. They have constant recruitment needs because the turnover in this industry is high and it is difficult to get people with relevant skills. One of the CEOs commented on how their growth performance was affected by constraints on human capital:

> *When we were growing into Australia, we just could not find qualified people. So the decision we made was compromised some of our standards on people…….So, if we would do anything differently again, we probably wouldn't hire some of the people that we hired. It certainly made life a lot more difficult in managing that growth.*

During their venture into Australia there was a problem managing both New Zealand and Australian markets. This firm paid a high price by losing its dominant position in New Zealand. He further commented:

> *….the second biggest thing we did in terms of growing into Australian market is we took our eyes off the ball a little bit in the New Zealand where we had a strong position rather than continuing to be proactive in dominating the market here. So, we lost a bit of market share in New Zealand because our focus was in Australia.*

The firm's lack of human capital made managing the development more challenging and caused a lot of problems maintaining its market position. As a result, growth performance was greatly affected. This example shows that human capital can improve the performance of technology-based firms. A hypothesis is developed:

*H11: Human capital is related positively to the performance of technology-based firms.*

#### *4.5.4 Financial Barriers*

A technology business needs continual innovation effort in order to follow changes in the market. These efforts usually incur high costs as the firm needs to have a research team with appropriate skills and equipment. After a new innovation is brought out there are costs involved in bringing the solution to the market. Fifteen of the firms interviewed sell their products and services to other businesses, therefore the market for

their solutions is very limited compared to the consumer market. The solution or product usually requires a big investment from the customers. The result is a longer sales process before the technology-based firms can secure business. One Malaysian CEO said:

> *So the challenge really in the sales process the first thing is we have to customise. We spend a lot of time. We have our creative people do mock ups, some examples, animation and all this is costs and when we approach a client, well they will call for a tender so then there is the investment of time in the tender process. After that, you have all the discussions and things like that and there is no guarantee you get it. So it can take one to two years and there are many deals that we have lost out on maybe for political reasons or maybe price competitiveness.*

In such situations, high growing technology-based firms need sufficient funding to ensure their survival and expansion. As mentioned earlier, it is very difficult to source finances externally. Many technology-based firms depend on cash flow generated from operational profit to provide funds for growth. This is consistent with a study conducted by Davidsson et al. (2009) who argue that firms which grow without first securing high levels of profitability tend to be less successful in subsequent periods than firms which secure high profitability first through low growth. However, the same situations were faced by both sustained and non-sustained high growers. The interview results did not sufficiently support the notion of Davidsson et al. (2009). Nevertheless, many of the high-growth firms were willing to open themselves to public ownership or accept acquisition in order to overcome financial constraints.

The effects of financial constraint can be demonstrated by the experiences of a firm which was trying to expand its international markets. Overseas expansion can be exciting and encourage growth but not all such efforts are successful. One of the New Zealand firms pulled out of its joint venture in Brazil for reasons of profitability and culture. This venture did not bring in the profit expected to sustain the business, and the firm had a turnaround strategy for its international expansion. As the CEO commented:

> *…….we've grown and shrunk in size and in geographies, so we grew pretty quickly for a while there and we were obviously in Australia, we were in Brazil*

*and doing stuff in the U.S but we didn't have the backing structures and even the financial reserves to do that consistently*.

Though foreign market expansion is an imperative growth strategy for this group of firms, it can bring mixed growth performance. Building a successful presence in a new foreign market requires extensive resources such as time, money and human capital, so sufficient profitability or financial reserves are pre-requisites for such an expansion strategy. Therefore it can be said that the availability of finance or profitability can have a positive impact on performance.

*H12: Available finance is related positively to the performance of technology-based firms*

Other challenges were mentioned during the interviews, including managing change in the external environment, overcoming intense competition, fulfilling customer expectation, handling product development, developing appropriate systems to manage growth, finding clear future directions and installing suitable management structures for growth. From the challenges mentioned, including human capital and finance issues, it can be concluded that high-growth technology-based firms are concerned with their abilities to manage both internal and external environments. They are aware that their future growth performance has a direct relationship to the way they interact with their environments. The basis of achieving high growth is not only the surge in demand, industry growth rate or technological change; it also incorporates the interplay with elements in their internal and external environments.

### 4.6 Criteria for Sustained Growth and SWOT analysis

There were a few criteria defined by the high-growth technology-based firms as ingredients for sustained growth. These criteria can be grouped according to environment:

a) Internal environment factors:

   Good talent, systems to manage growth, good control and monitoring, having the right product, focus in offering product, continuous innovation, speed and

agility, correct and sustainable business philosophies, vision and long term plan, strategy, profitability and funds for growth, good brand and image.

b) External environment factors:
   Sensitivity to market change, good customer relationships.

Internal factors are more dominant in the above criteria and this could imply that a firm's ability to sustain growth depends largely on its internal resources and capabilities. The external environment has a big influence on performance results. Therefore technology-based firms have to work continuously on building their strengths in order to sustain growth.

During the interviews, the CEOs were asked to conduct a SWOT analysis. Based on their compilations, a SWOT table is developed in Table 4-3. The items listed were arranged according to frequency, with the most frequently mentioned on top and the least frequently mentioned at the bottom. Items that were mentioned by less than five firms are in a smaller font to show comparisons in the table. These SWOT compilations indicate that the high-growth technology-based firms had a clear understanding of their internal and external environments. Although they faced many challenges arising from internal weaknesses and external threats, they had the strength to overcome these challenges. In addition they were keen to explore new opportunities for continuous growth.

**Table 4-3 SWOT Analyses Compiled from Firms Interviewed.**

| **Strengths** | **Weaknesses** |
|---|---|
| Innovation<br>Agility<br>Positive cultures and values<br>High quality human capital<br>Efficiency<br>First mover advantage<br>Flexible solutions<br>Good understanding of market and technology<br>Competent top management<br>Clear vision and goals | Limitation in size<br>Lack of human capital<br>Lack of funds<br>Lack of drive to solve problems quickly<br>Geographical location<br>Lack of marketing effort<br>Poor inter-departmental communication<br>Sole proprietor risk |
| **Opportunities** | **Threats** |
| Great market potential<br>New technology/product development<br>New market needs<br>Positive regulatory change<br>Merger and acquisitions opportunities | Intense competition<br>Negative regulatory change<br>Redundant technology<br>Overwhelming market demands<br>Market maturity<br>Negative business confidence in country |

## 4.7 Model Development and Conclusion

Based on the hypotheses built through the discussion in this chapter, a model demonstrating the relationship between all the key concepts is developed as shown in Figure 4.1. This model assumes that sources, resources and capabilities worked to form strategies to achieve high growth performance. However, performance was also influenced by the growth challenges such as external environment effects, industry competition, human resources and financial barriers. Table 4-4 has been developed to compare the major findings from this study with other related studies and examine whether the elements in each of these concepts are consistent with previous studies; Studies which had similar results are listed in the positive association column. Those studies which tested the elements but did not find any relationship with business growth are listed in the no association column. Finally, several studies produced different findings and these are listed in the negative association column. This comparison shows mixed results in some characteristics such as team founding, role of innovation, product concentration, market expansion and financial/profitability constraints. Most of the previous studies were conducted across different industries in different locations, which might be a reason for the inconsistencies. It is important therefore that industry effects are minimised in order to show the differences between high-growth and low-growth firms.

## 4.8 Summary

This chapter summarises the themes that emerged from the sixteen interviews and case studies. These themes were then developed into several sets of hypotheses. The next step is to test the hypotheses on a larger sample of firms. This will help to generalise the themes identified from the case studies. The following chapters will discuss the results of a survey conducted on all technology-based firms in Malaysia and New Zealand.

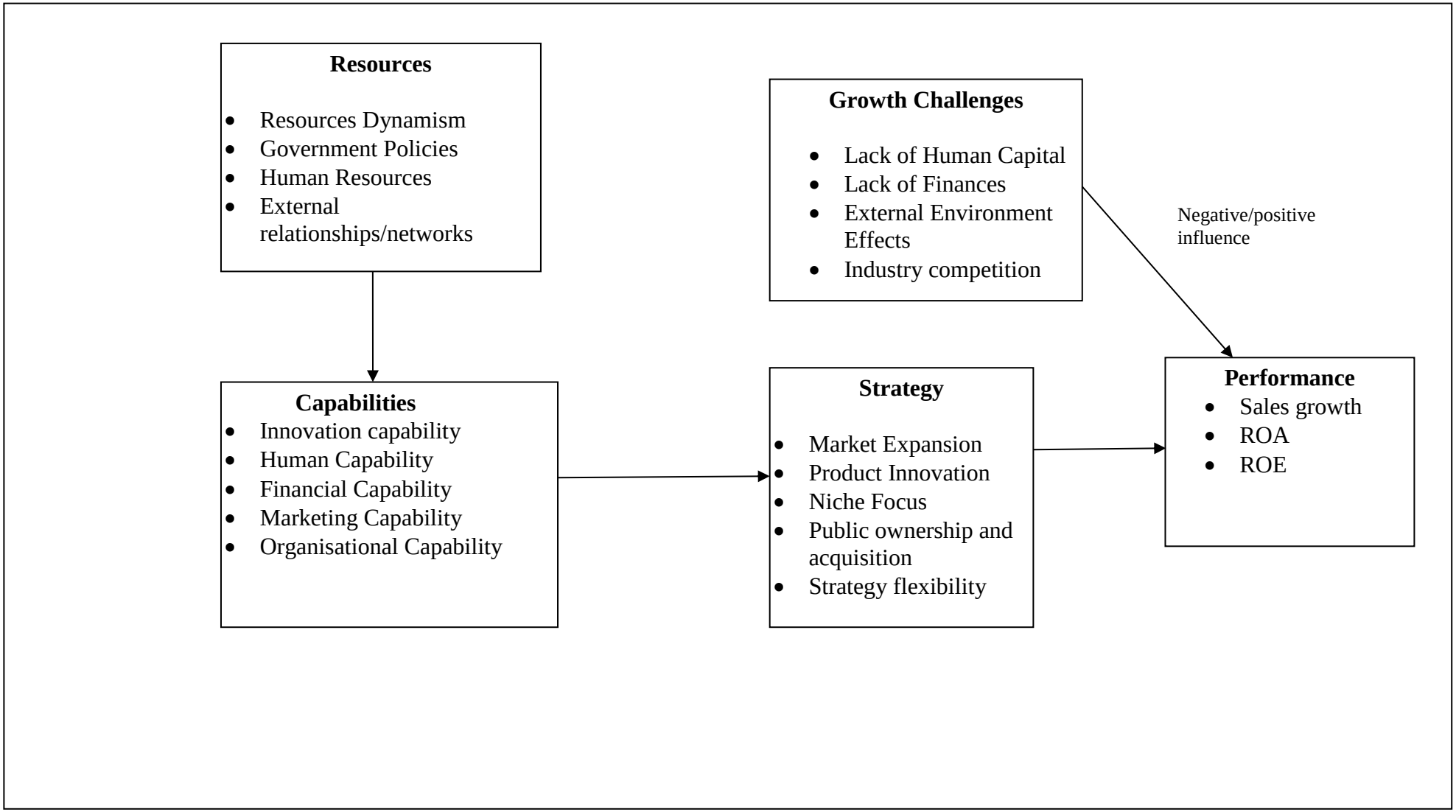



**Figure 4.1 Research Framework Developed from Qualitative Findings**

**Table 4-4 A Comparisons on Findings from this Study with Related Previous Studies**

| Major findings from this study | Positive Association | No Association | Negative Association |
|---|---|---|---|
| Team founding | Barkman (1994), Storey (1994), Dobbs & Hamilton (2007) | Barringer et al. (2005) | |
| Founder's relevant experiences | Barringer et al. (2005), Tan (2007), Zhang et al (2008), Baum et al (2001), Dobbs & Hamilton (2007) | | |
| Small and medium enterprises | Tan (2007), Mason & Brown (2010), Chen & Yuan (2007), Moreno & Casillias (2007) | | |
| Government support | Mason & Brown (2011) | | Yiu, Bruton & Lu (2005) |
| Multiple Network Relationship | Barringer et al. (2005), Mason & Brown (2010), Mohannak (2007), Litunnen and Viurtanen (2009), McKelvie & Wiklund (2010) | Lee et al. (2001) | |
| Business-to-business customers | Tan (2007), Mason & Brown (2010), Parker et al (2010) | | |
| Resources dynamism | Ravichandran & Lertwongsatien (2005), Helfat & Peteraf (2003), Chandler & Hanks (1994a) | | |
| Capabilities | Barringer et al. (2005), Tan (2007), Mason & Brown (2010), Wang & Ahmed (2007), Holzl (2009), Kim & Mauborgne (1997), Roper (1997), Mascarenhas et al (2002), Barbero et al. (2011), Teece (2009) | | |
| Market expansion strategy | Keogh & Evans (1999), Andersson (2003), Coad & Tamvada (2011) | Litunnen and Viurtanen (2009) | Davidsson et al. (2002), Parker et al. (2010) |
| Product innovation strategy | Baum et al. (2001), Barringer et al. (2005), Mason & Brown (2010), Parker et al. (2010), Zhang et al (2008), ), Litunnen and Viurtanen (2009), Leitner & Guldenberg (2010) | | |
| Niche focus strategy | Mosakowski (1999), Siegel et al. (1993) | | Baum et al. (2001) |
| Public ownership and acquisition strategy | Graebner (2004) Mascarenhas et al (2002), Andersson (2003), Coad & Tamvada (2011)<br>Dobbs & Hamilton (2007), Cooney (2009) Leitner & Guldenberg (2010) | | Parker et al. (2010) |
| External environment effects/industry competition | Zahra (1993), Parker et al. (2010), Zhang et al (2008) | | |
| Human resources barriers | Deeds et al (2000), Coad & Tamvada (2011) | | |
| Financial barriers | Moreno & Casillias (2007), Carpenter & Petersen (2002), Garnsey & Heffernean (2005b), Davidsson et al (2009), Coad & Tamvada (2011) | | |

# CHAPTER FIVE STUDY 2: ANALYSIS AND FINDINGS

## 5.1 Overview

This chapter discusses major findings from the statistical analysis of questionnaires distributed in Malaysia and New Zealand. As the study examines the nature of high-growth businesses in both countries, the survey results in this chapter were analysed by country. However, analyses were also carried out on all responses, aggregating the high-growth and non-high-growth firms in both countries. These analyses are reported in Appendix I. The analysis and findings based on each country is structured into eight sections. The first section describes characteristics of the sample used in the study. Section 2 presents a comparison of the significant differences between the New Zealand and Malaysia sample profiles. Section 3 checks the interval data collected from the questionnaires against statistical assumption. The next section examines factor structure and scale reliability. From here, relationships between the variables (resources, capabilities, strategies and performance) are discussed in Sections 5-8. These sections also sequentially address the hypotheses developed in Chapter 4. Path analysis outlining the relationships based on the conceptual model is examined by using PLS-Graph and is discussed in Section 9. The chapter concludes with a summary of results.

## 5.2 Sample Size and Data Collection

As outlined in Chapter 3, the data collection process started on January 2012 when participants were invited to take part in the study. After two data collection methods were used, i.e. a mail survey followed by online questionnaires and two follow-up rounds, the data collection was concluded on 20 July 2012. There were 177 questionnaires returned by invited participants. These responses were screened for missing values and incomplete information and 163 were useable. As there were two data collection methods used sequentially in the survey, responses received by mail (N=124) and responses received online (N=39) were compared using discriminant analysis. Responses received online were considered as late responses because the participants responded after the initial mail survey. T-tests were run on responses from both countries. New Zealand mail and online responses were compared as were the Malaysian responses in both categories. None of the variables showed significant

differences between the two categories in either country (two-tailed tests, $p<0.05$), thus suggesting that the different data collection methods and non-response bias should not concerns.

Common method biases arise from having a common rater, a common measurement context, a common item context or from the characteristics of the items themselves (Podsakoff, MacKenzie, Podsakoff & Lee 2003). As this study used a self-administered survey, it is important to assess the presence of common method variance. In this case, Harman's one-factor test was used where all variables in the questionnaire were entered into a factor analysis. The un-rotated factor analysis revealed 20 factors with eigenvalues greater than one and no single factor was dominant. According to the assumption of the one factor test, if a substantial amount of common method variance exits in the data, either a single factor will emerge or one 'general' factor will account for the majority of the covariants among the variables (Podsakoof & Organ 1986). The results showed that common method variance was not a potential problem in the data.

New Zealand provided 110 usable responses while Malaysia provided only 53. Based on the number of invitation letters (excluding those with wrong address or invalid firm data) sent out to the Chief Executive Officers of technology-based firms in the two countries, New Zealand had a final response rate of 18.2% while Malaysia's response rate was 5.3%. According to Snow & Thomas (1994), strategic management surveys produce relatively low response rates especially when top managers are surveyed. As no previous similar studies have been conducted in either country, it is difficult to evaluate whether the response rate is reasonable in the context of these countries. However, the New Zealand response rate was slightly higher than that of a similar study conducted in Australia (Galbreath & Galvin 2008) using similar informants in a different industry. According to Harzing (2000), the response rate in a cross-country survey is affected by how closely related in terms of culture and geographical locations the survey distribution country is to the target country. Countries a considerable distance away generates lower response rates. Her study also mentions that mail surveys generate very low response rates in South East Asia. In this study, the invitation letters were sent from New Zealand to firms in Malaysia. The two countries are geographically and culturally distant. Malaysia also scores highly in the power distance index according to Geert Hofstede (Hofstede 2012). It is therefore not

surprising that the response rate from Malaysia is low. A study conducted by Nah, Zuckweiler & Lau (2003) targeting Chief Information Officers in Malaysia reported a similar response rate. Although their study was conducted by a group of researchers in Malaysia, the response rate was also low.

### 5.3 Sample Composition

The sample composition of both countries is presented in Table 5-1. Chi-square test and Fisher's exact test were used to see if there was a difference between New Zealand and Malaysia responses in a particular characteristic. The number of responses and the percentage (in brackets) are reported in the country column, and the last column shows Pearson's chi-square test statistics. However, in some characteristics that have less than 5 in one cell, Fisher's exact test value was reported. If there is a difference between two countries, the significance value must be less than 0.05.

Results from the tests showed both similarities and differences between the New Zealand and Malaysian responses. First of all, there was no difference in the growth category between the countries ($\chi^2$ (1) =1.1779, p=0.242). Both sets of responses have a similar composition of high-growth and non-high-growth firms. The information in this category was gathered by checking the self-evaluated question in the questionnaire. Respondents were asked whether their firms had achieved high-growth performance according to the OECD (2010) definition. If they answered yes, they were considered as high-growth firms, otherwise, they were considered as non-high-growth firms. The second similarity between the countries was that the majority of respondents from the two countries were the firms' founders, who were able to provide important information and insights into their businesses ($\chi^2$ (1) =2.589, p=0.116).

However, there was a difference between the two countries in the respondents' highest academic qualification attained (Fisher's exact test value =34.952, p=0.00**). All the respondents from Malaysia had at least a diploma or certificate after their high school education whereas (about) 32% of the New Zealand respondents had only high school certificates or lesser qualifications. Malaysian respondents appeared to have higher qualifications: about 49% had postgraduate degrees. It is common in a high power distance society like Malaysia for management teams and organisation leaders to have

at least a tertiary degree. On the other hand, New Zealand is considered to be a westernised society where there is more emphasis on equality and individualism, so it is not surprising that some of their CEOs do not have tertiary degrees. In the context of the technology industry, the ability to set up and run a technology-based firm is often associated with the creativity and innovativeness of the entrepreneur. As well as the difference in academic qualifications, there was a difference between the two countries in the number of board positions on other firms held by their CEOs ($\chi^2$ (4) =14.124, p=0.013*). A lower percentage of New Zealand owners held board positions in other firms. This might indicate that Malaysia firms would be able to create closer ties with external networks through their owners' involvement in other businesses. The majority of firms in both countries were founded by more than one person, which is consistent with findings from the qualitative study conducted prior to this survey. However, Malaysia had a higher percentage of team founding than New Zealand ($\chi^2$ (1) =7.717, p=0.005*). Only 24.5% of Malaysian firms were founded by individuals compared with 47.3% in New Zealand. This could be due to the different national cultures, one collectivism (Malaysia) and the other with strong individualism influences (New Zealand). Therefore, compared with Malaysians, Kiwis are more inclined to set up businesses by themselves.

In terms of the characteristics of firms there were some similarities between the countries. The business structures of respondent firms were quite similar, with the majority privately-owned (Fisher's exact test value =7.411, p=0.130). They also had similar customer profiles (Fisher's exact test value =1.207, p=0.643). Most firms sold to both domestic and overseas customers. Furthermore, most of the firms had a higher percentage of domestic customers (that is, in their own countries). Similar to the findings of Study 1 and previous studies (Tan 2007; Mason & Brown 2010), the survey showed that the majority of the technology-based firms (more than 65%) in both countries had a higher percentage of sales generated from other businesses (Fisher's exact test value =0.325, p=0.988). Sales generated from government sectors and direct consumers accounted for smaller percentages of their sales totals.

Differences were also revealed in the statistical tests. Malaysian firms were found to be generally newer than New Zealand firms. Though most of the firms had been going for 6-15 years, New Zealand appeared to have older firms, with 20.9% that had operated

for more than 25 years (Fisher's exact test value =28.882, p=0.000**). The reason could be that as a developed country New Zealand developed its technology industry earlier, while Malaysia is currently a high-growth developing country. This would also explain why Malaysia has a higher percentage of younger firms. During the examination of high-growth technology-based firms in Study 1, Malaysia was found to have a larger number of employees compared with New Zealand firms. The finding from this survey ($\chi^2$ (3) =9.540, p=0.022*) is consistent with the profile established in Study 1.

The Malaysian government has a generic policy of providing assistance to technology-based firms while the New Zealand government has adopted a selective policy based on growth potential. This was confirmed by the government assistance received by the respondent firms in both countries ($\chi^2$ (1) =33.199, p=0.000**). Malaysia had a higher percentage of firms receiving government assistance, while New Zealand had a lower percentage. Close to 60% of New Zealand firms did not receive any direct assistance from government. The types of assistance mentioned were similar to those found in Study 1. A similar trend was found in the external relationships/networks assistance area, where a higher percentage of Malaysian firms worked with external relationships/networks ($\chi^2$ (1) =6.680, p=0.015*). This could be due to owners' involvement in other businesses through their board positions. Getting involved in other businesses opens up opportunities for external relationships/networks and collaborations. Networking activities include research and development collaborations, financial advice, management insights and market-related assistance.

Finally, there was a difference between the countries in their current ambitions for growth (Fisher's exact test value =9.577, p=0.021*). New Zealand firms seemed to be more conservative in their ambitions with about 70% looking for moderate to substantial growth, while Malaysia had more than 90% in that category. More New Zealand firms hoped to stay the same size, indicating lower motivation for growth. However, this relationship has to take into consideration the firms' growth categories. The first row in Table 5-1 shows that Malaysia had a higher percentage of high-grower than low-grower firms. It was also found that the chi-square statistic test between growth group and growth strategy was significant at $p<0.05$ where $\chi^2$ (3) = 22.893. The

significance of country on growth desire could be affected by the composition of the growth group, though there was no significance between the countries in this case.

**Table 5-1 Sample Composition**

| Profile | New Zealand (N=110) | Malaysia (N=53) | Pearson's Chi-square test statistics | Country difference |
|---|---|---|---|---|
| **High growth?** | | | $\chi^2$ (1)=1.1779, p=0.242 | No |
| Yes | 50*(45.5)* | 30*(56.6)* | | |
| No | 60*(54.5)* | 23*(43.4)* | | |
| **Founder?** | | | $\chi^2$ (1)=2.589, p=0.116 | No |
| Yes | 81*(73.6)* | 45*(84.9)* | | |
| No | 29*(26.4)* | 8*(15.1)* | | |
| **Highest Academic Qualification** | | | *Fisher's exact test value =34.952, p=0.00*** | Yes |
| Less than high school cert | 5*(4.5)* | 0 | *is reported as 4 cells have* | |
| High school certificate | 30*(27.3)* | 0 | *expected count less than 5.* | |
| Diploma/certificate | 8*(7.3)* | 4*(7.5)* | | |
| Bachelor degree | 48*(44.4)* | 23*(43.4)* | | |
| Master degree | 14*(12.7)* | 16*(30.2)* | | |
| PhD or other doctorate | 5*(4.5)* | 10*(18.9)* | | |
| **Team Founding** | | | $\chi^2$ (1)=7.717, p=0.005* | Yes |
| Yes | 58*(52.7)* | 40*(75.5)* | | |
| No | 52*(47.3)* | 13*(24.5)* | | |
| **Board Position** | | | $\chi^2$ (4)=14.124, p=0.013* | Yes |
| None | 66*(60.0)* | 20*(37.7)* | | |
| One | 16*(14.5)* | *6(11.3)* | | |
| Two | 12*(10.9)* | 14*(26.4)* | | |
| Three | 5*(4.5)* | 8*(15.1)* | | |
| Four or more | *11(10.0)* | 5*(9.4)* | | |
| **Firm Age Group** | | | *Fisher's exact test value =28.882, p=0.000*** | Yes |
| 5 years and below | 4*(3.6)* | 15*(28.3)* | *is reported as 1 cell has* | |
| 6-10 years | 27*(24.5)* | 12*(22.6)* | *expected count less than 5.* | |
| 11-15 years | 30*(27.3)* | 14*(26.4)* | | |
| 16-20 years | 19*(17.3)* | 6*(11.3)* | | |
| 21-25 years | 7*(6.4)* | 5*(9.4)* | | |
| More than 25 years | 23*(20.9)* | 1*(1.9)* | | |
| **Full time employees** | | | $\chi^2$ (3)=9.540, p=0.022* | Yes |
| 10 and below | 56*(50.9)* | 18*(34)* | | |
| 11-50 | 40*(36.4)* | 18*(34)* | | |
| 51-150 | 10*(9.1)* | 11*(20.8)* | | |
| More than 150 | 4*(3.6)* | 6*(11.2)* | | |
| **Business Structure** | | | *Fisher's exact test value =7.411, p=0.130* | No |
| Sole proprietor | 5*(4.6)* | 2*(3.8)* | *is reported as 6 cells have* | |
| Partnership | 1*(0.9)* | 4*(7.5)* | *expected count less than* | |
| Private firm | 97*(88.2)* | 42*(79.2)* | | |
| Public firm | 5*(4.5)* | 5*(9.5)* | | |
| Business subsidiary | 2*(1.8)* | 0 | | |
| **Major customer type** | | | *Fisher's exact test value =0.325, p=0.988* | No |
| Other businesses | 75*(68.2)* | 35*(66)* | *is reported as 1 cell has* | |
| Government | 10*(9.1)* | 5*(9.4)* | *expected count less than* | |
| Consumers | 20*(18.2)* | 11*(20.8)* | | |
| Other business=Consumers | 5*(4.5)* | 2*(3.8)* | | |
| **Major customer location** | | | *Fisher's exact test value =1.207, p=0.643* | No |
| Domestic | 83*(75.5)* | 36*(67.9)* | *is reported as 1 cell has* | |
| Overseas | 22*(20.0)* | 14*(26.4)* | *expected count less than* | |
| Equal | 5*(4.5)* | 3*(5.7)* | | |

| Profile | New Zealand (N=110) | Malaysia (N=53) | Pearson's Chi-square test statistics | Country difference |
|---|---|---|---|---|
| **Government Assistance** | | | $\chi^2$ (1)=33.199, p=0.000** | Yes |
| Yes | 45*(40.9)* | 47*(88.7)* | | |
| No | 65*(59.1)* | 6*(11.3)* | | |
| **External Networking** | | | $\chi^2$ (1)=6.680, p=0.015* | Yes |
| Yes | 72*(65.5)* | 45*(84.9)* | | |
| No | 38*(34.5)* | 8*(15.1)* | | |
| **Growth Desire** | | | *Fisher's exact test value =9.577, p=0.021** *is reported as 2 cells have expected count less than* | Yes |
| Stay the same size | 14*(12.7)* | 1*(1.9)* | | |
| Slow growth | 19*(17.3)* | 4*(7.5)* | | |
| Moderate growth | 47*(42.7)* | 32*(60.4)* | | |
| Substantial growth | 30*(27.3)* | 16*(30.2)* | | |

**p<0.05; ** p<0.01*

## 5.4 Scale Structure and Reliability

Based on the findings from Study 1, a number of factors seem to have impacted on growth and performance. As these factors were measured by indicators adopted from interviews and previous studies, it is important to identify indicators that underlie the variables. Principal Component Analysis was used to uncover the structure of each factor and to determine internal reliability. There are several methods to choose from when running Principal Component Analysis, and the varimax rotation method was chosen in this study. It is a good general approach that simplifies the interpretation of factors and it is strongly encouraged for a first analysis (Field 2009). A minimum loading criteria of 0.4 was adopted and any indicator with more than 0.5 for two or more factors was deemed a cross-loading indicator. Subsequent to principal component analysis, all the variables used in this study were tested for internal consistency by checking their Cronbach's alpha value. The Cronbach's alpha value for each variable (based on the indicators identified in factor reduction) is presented in Table 5-2. The analyses were also conducted on the basis of two countries.

### *Performance Variable*

Three items were used as performance variables: return on asset, return on equity and sales growth. As expected, each of these items produced a single factor that explained 74.4% of variance in New Zealand and 81.91% of variance in Malaysia. The Kaiser-Mayer-Olkin measure verified the sampling adequacy for the analysis, KMO=0.63 in New Zealand and 0.74 in Malaysia were well above the acceptable limit of 0.5 (Field,

2009). The Cronbach's alpha value of this variable was 0.80 in New Zealand and 0.89 in Malaysia, which is considered highly reliable.

**Table 5-2 Cronbach's Alpha Reliability for Variables**

| Variables | Cronbach's Alpha | |
|---|---|---|
| | ***New Zealand*** | ***Malaysia*** |
| ***Performance*** | 0.80 | 0.89 |
| ***Strategy*** | | |
| Product Innovation | 0.76 | 0.76 |
| Market Expansion | 0.62 | 0.50 |
| Remaining-in-private-ownership | 0.76 | 0.73 |
| Niche Focus* | 0.33 | 0.49 |
| Acquisition for growth* | 0.33 | 0.18 |
| Strategy Flexibility | 0.75 | 0.81 |
| ***Resource-Capabilities*** | | |
| Government Policies | 0.83 | 0.91 |
| Human Resources | 0.68 | 0.73 |
| External Network | 0.58 | 0.61 |
| Resources Dynamism | 0.65 | 0.63 |
| Innovation Capability | 0.83 | 0.68 |
| Human Capability | 0.92 | 0.77 |
| Organisational Capability | 0.83 | 0.73 |
| Marketing Capability | 0.71 | 0.71 |
| Financial Capability | 0.87 | 0.89 |
| ***Challenges*** | | |
| External Environment Effects | 0.71 | 0.81 |
| Industry Competition | 0.50 | 0.61 |
| Financial Barriers | 0.62 | 0.79 |
| Human Capital Barriers | 0.58 | 0.79 |

**factor not included in subsequent analysis*

### *Resource-Capabilities Variables*

Analysis of 11 items related to resources produced four factors, namely government policies, external relationships/networks, human resources and resources dynamism. The Kaiser-Mayer-Olkin measure verified the sampling adequacy for the analysis, KMO=0.72 in New Zealand and 0.62 in Malaysia. The four factors explained 64.4% of the variance in New Zealand and 62.4% in Malaysia. For the analysis of capability measures, 24 items were loaded and produced five factors: innovation capability, human capability, organisational capability, marketing capability and financial capability. The Kaiser-Mayer-Olkin measure verified the sampling adequacy for the analysis, KMO=0.84 in New Zealand and 0.70 in Malaysia. These five components had eigenvalues over Kaiser's criterion of 1 and, in combination, explained 69.53% of the variance in New Zealand and 66.18% of variance in Malaysia. Several indicators were

removed due to cross-loadings and low communalities. As a result, one item was removed from government (Gov3) and human resources (HR1), two items from organisational capabilities (Ocap 6 & 7) and marketing capabilities (Mcap 3 & 5). Cronbach's alpha values for all factors range from 0.92 to 0.58 except external relationships/networks. Nunally (1978) suggests a minimum criterion of $\alpha$=0.70. Nevertheless, Nunnally (1967) states that reliabilities of $\alpha$=0.50 to $\alpha$=0.60 are sufficient for the early stages of basic research.

***Strategy Variables***

Several growth strategies were identified in Study 1: market expansion, product innovation and niche focus, public ownership and acquisition, strategy flexibility. All indicators were loaded in the principal component analysis and produced six factors. It was found that public ownership and acquisition items were split into two different factors. Two items (Pac1 & 4) were grouped and negatively coded to become a factor named remaining-in-private-ownership for hypothesis testing. Both items originally indicated the willingness to be acquired and sacrifice private ownership. The other three items (PAC 2, 3 &5) related to acquisitions for growth. The Kaiser-Mayer-Olkin measure verified the sampling adequacy for the analysis, KMO=0.66 in New Zealand and 0.61 in Malaysia. Based on cross-loadings and low communalities criteria, one item was removed from market expansion strategy (Exp2), one item (Fle1) from strategy flexibility and two items from product innovation strategy (Inn 3 & 5). The six components had eigenvalue over Kaiser's criterion of 1 and, in combination, explained 67.52% of the variance in New Zealand and 69.3% in Malaysia. Market expansion, product innovation, remaining-in-private ownership and strategy flexibility ranged in Cronbach's alpha value from 0.81 to 0.50 in both countries. It was found that the internal reliability for niche focus and acquisition for growth was far below 0.50. Therefore, these factors were not included in the subsequent analysis.

***Challenges Variables***

There were four challenges accounted in the developed model: external environment effect, industry competition, human capital barrier and financial barriers. In addition, five items identified from the interviews were categorised as marketing and organisational barriers. However, the principal component analysis identified only four factors. Items from marketing and organisational barriers were found to be cross-loaded

and were eventually removed from the factor analysis. Among the remaining factors, Ext 1, Ext 3 and HBar 3 were removed due to low communalities. The three components had eigenvalue over Kaiser's criterion of 1 and in combination explained 65.02% of variance in New Zealand and 70.06% in Malaysia; with KMO=0.57 and 0.75 respectively. As the indicators for these variables were generated from interviews in Study 1 which had not been used in previous studies, the Cronbach's alpha value was slightly lower in the barriers measure, ranging from 0.81 to 0.50. These values still fulfil the range recommended by Nunnally (1967).

### 5.5 Descriptive Statistics

For the items remaining after exploratory factor analysis, the mean, median and standard deviation scores are presented alongside with kurtosis and skewness. Descriptive statistics are used to explain the data distribution, especially in detecting non-normality. According to Garson (2012), kurtosis and skewness should be within the +2 and -2 range when the data are distributed normally. Table 5-3 and 5-4 show the descriptive statistics for samples in Malaysia and New Zealand. All items except two were found to be approximately normal in both countries. A correlation matrix for all the computed constructs/variables used in this table is provided in Table 5-5 and Table 5-6.

**Table 5-3 Descriptive Statistics for Variables (New Zealand)**

| Variables/Code | Mean | Median | Std Dev. | Kurtosis | Skewness |
|---|---|---|---|---|---|
| **Performance** | | | | | |
| ROA | 4.39 | 4.00 | 1.16 | -0.13 | 0.41 |
| ROE | 4.49 | 4.00 | 1.30 | -0.64 | 0.10 |
| Sales Growth | 4.52 | 4.00 | 1.39 | -0.11 | 0.10 |
| **Strategy** | | | | | |
| Inn1 | 4.32 | 4.00 | 1.62 | -0.94 | -0.19 |
| Inn2 | 5.17 | 5.00 | 1.44 | 0.55 | -0.94 |
| Inn4 | 4.96 | 5.00 | 1.46 | -0.32 | -0.40 |
| Exp1 | 3.64 | 3.00 | 2.24 | -1.53 | 0.18 |
| Exp3 | 5.58 | 6.00 | 0.90 | 0.11 | -0.42 |
| Exp4 | 4.89 | 5.00 | 1.36 | 0.28 | -0.69 |
| PAC1 | 3.51 | 3.00 | 2.02 | -1.35 | 0.17 |
| PAC4 | 4.14 | 4.50 | 1.98 | -1.19 | -0.19 |
| Fle2 | 4.81 | 5.00 | 1.44 | 0.13 | -0.79 |
| Fle3 | 4.82 | 5.00 | 1.29 | -.014 | -0.69 |
| **Resource-Capabilities** | | | | | |
| Gov1 | 2.82 | 3.00 | 1.53 | -0.79 | 0.45 |
| Gov2 | 3.16 | 3.00 | 1.67 | -1.08 | 0.26 |
| Res1 | 3.74 | 4.00 | 1.87 | -1.20 | 0.04 |
| Res2 | 3.97 | 4.00 | 1.57 | -0.53 | -0.13 |
| Res3 | 4.99 | 5.00 | 1.44 | 0.12 | -0.72 |
| HR2 | 4.80 | 5.00 | 1.75 | -0.25 | -0.78 |
| HR3 | 4.70 | 5.00 | 1.53 | -0.23 | -0.50 |
| Ntw1 | 4.28 | 4.00 | 1.41 | -0.46 | -0.31 |
| Ntw2 | 4.57 | 5.00 | 1.47 | -0.17 | -0.62 |
| Icap1 | 4.31 | 5.00 | 1.85 | -1.15 | -0.34 |
| Icap2 | 4.78 | 5.00 | 1.78 | -0.32 | -0.85 |
| Icap3 | 4.32 | 5.00 | 2.08 | -1.25 | -0.33 |
| Hcap1 | 5.02 | 5.00 | 1.38 | 0.79 | -0.99 |
| Hcap2 | 4.84 | 5.00 | 1.44 | 0.08 | -0.80 |
| Hcap3 | 5.40 | 6.00 | 1.43 | 0.80 | -1.00 |
| Hcap4 | 5.27 | 6.00 | 1.36 | 0.77 | -1.00 |
| Ocap1 | 4.69 | 5.00 | 1.55 | -0.17 | -0.54 |
| Ocap2 | 4.80 | 5.00 | 1.45 | 0.33 | -0.64 |
| Ocap3 | 5.15 | 5.00 | 1.47 | 0.92 | -1.03 |
| Ocap4 | 5.26 | 5.00 | 1.38 | 1.95 | -1.24 |
| Ocap5 | 5.22 | 5.00 | 1.40 | 0.62 | -0.80 |
| Mcap1 | 5.70 | 6.00 | 1.16 | 2.19 | -1.18 |
| Mcap2 | 5.77 | 6.00 | 1.13 | 2.16 | -1.14 |
| Mcap4 | 5.79 | 6.00 | 1.25 | 0.87 | -1.16 |
| Mcap5 | 5.30 | 6.00 | 1.35 | 0.12 | -0.71 |
| Fcap1 | 5.45 | 6.00 | 1.41 | 0.43 | -0.78 |
| Fcap2 | 4.72 | 5.00 | 1.46 | 0.12 | -0.61 |
| Fcap3 | 4.39 | 5.00 | 1.90 | -0.9 | -0.42 |
| Fcap4 | 4.98 | 5.00 | 1.52 | 0.09 | -0.65 |
| Fcap5 | 4.00 | 4.00 | 1.63 | -0.64 | -0.27 |
| **Challenges** | | | | | |
| Hbar1 | 4.18 | 4.00 | 1.75 | -1.08 | -0.18 |
| Hbar2 | 3.53 | 3.50 | 1.62 | -0.85 | 0.24 |
| Fbar1 | 4.20 | 5.00 | 1.92 | -1.15 | -0.40 |
| Fbar2 | 3.20 | 3.00 | 1.81 | -0.91 | 0.44 |
| Ext2 | 3.65 | 4.00 | 1.53 | -0.69 | 0.17 |
| Ext4 | 4.74 | 5.00 | 1.56 | -0.46 | -0.52 |
| Ext5 | 4.34 | 5.00 | 1.45 | -0.60 | -0.33 |
| Pete1 | 5.02 | 5.50 | 1.79 | -0.59 | -0.71 |
| Pete2 | 4.50 | 4.50 | 1.65 | -0.67 | -0.25 |
| Pete3 | 4.19 | 4.00 | 1.67 | -1.14 | -0.25 |

**Table 5-4 Descriptive Statistics for Variables (Malaysia sample)**

| Variables/Code | Mean | Median | Std Dev. | Kurtosis | Skewness |
|---|---|---|---|---|---|
| **Performance** | | | | | |
| ROA | 4.84 | 5.00 | 1.19 | -0.23 | 0.33 |
| ROE | 4.92 | 5.00 | 1.28 | -0.20 | 0.33 |
| Sales Growth | 4.96 | 5.00 | 1.24 | -0.12 | -0.55 |
| **Strategy** | | | | | |
| Inn1 | 5.41 | 6.00 | 1.00 | -0.24 | -0.46 |
| Inn2 | 5.81 | 6.00 | 0.92 | -0.62 | -0.37 |
| Inn4 | 5.58 | 6.00 | 1.12 | 1.57 | -1.10 |
| Exp1 | 5.16 | 5.00 | 1.76 | -0.83 | -0.53 |
| Exp3 | 5.96 | 6.00 | 1.05 | -0.40 | -0.64 |
| Exp4 | 5.58 | 6.00 | 0.88 | 0.34 | -0.44 |
| PAC1 | 5.30 | 6.00 | 1.42 | -0.69 | -0.47 |
| PAC4 | 4.89 | 5.00 | 1.72 | -0.25 | -0.88 |
| Fle2 | 5.28 | 5.00 | 1.06 | -0.66 | -0.10 |
| Fle3 | 5.05 | 5.00 | 1.28 | 0.96 | -0.80 |
| **Resource-Capabilities** | | | | | |
| Gov1 | 4.54 | 5.00 | 1.46 | -0.23 | -0.57 |
| Gov2 | 4.75 | 5.00 | 1.50 | -0.41 | -0.55 |
| Res1 | 4.81 | 5.00 | 1.76 | -0.22 | -0.79 |
| Res2 | 5.32 | 5.00 | 1.28 | 0.10 | -0.63 |
| Res3 | 5.68 | 6.00 | 0.96 | -1.02 | 0.01 |
| HR2 | 5.75 | 6.00 | 0.91 | 2.05 | -1.18 |
| HR3 | 5.39 | 5.00 | 0.98 | 1.90 | -0.76 |
| Ntw1 | 4.75 | 5.00 | 1.00 | 0.12 | 0.16 |
| Ntw2 | 4.96 | 5.00 | 1.10 | 0.11 | -0.99 |
| Icap1 | 6.13 | 6.00 | 0.90 | 1.55 | -1.09 |
| Icap2 | 5.87 | 6.00 | 0.85 | -0.53 | -0.31 |
| Icap3 | 5.73 | 6.00 | 1.15 | 0.00 | -0.81 |
| Hcap1 | 5.50 | 6.00 | 0.69 | -0.10 | -0.39 |
| Hcap2 | 5.90 | 6.00 | 0.84 | -0.71 | -0.22 |
| Hcap3 | 5.66 | 6.00 | 0.90 | -0.72 | -0.09 |
| Hcap4 | 5.54 | 5.00 | 0.69 | -0.29 | 0.54 |
| Ocap1 | 5.28 | 5.00 | 0.86 | -0.19 | 0.52 |
| Ocap2 | 5.13 | 5.00 | 0.90 | -0.57 | 0.39 |
| Ocap3 | 5.52 | 5.00 | 1.03 | -0.64 | -0.13 |
| Ocap4 | 5.81 | 6.00 | 0.78 | -0.44 | -0.14 |
| Ocap5 | 5.71 | 6.00 | 0.86 | -0.80 | 0.03 |
| Mcap1 | 5.88 | 6.00 | 0.91 | -0.64 | -0.40 |
| Mcap2 | 5.90 | 6.00 | 1.00 | 0.11 | -0.75 |
| Mcap4 | 6.15 | 6.00 | 0.86 | 2.35 | -1.23 |
| Mcap5 | 5.62 | 6.00 | 1.00 | -0.46 | -0.23 |
| Fcap1 | 5.92 | 6.00 | 0.99 | 0.04 | -0.69 |
| Fcap2 | 5.47 | 6.00 | 1.10 | -0.97 | -0.15 |
| Fcap3 | 5.56 | 6.00 | 1.15 | -0.76 | -0.40 |
| Fcap4 | 5.64 | 6.00 | 1.05 | -0.18 | -0.44 |
| Fcap5 | 4.90 | 6.00 | 1.44 | 0.36 | -0.65 |
| **Challenges** | | | | | |
| Hbar1 | 4.96 | 5.00 | 1.37 | 0.18 | -0.63 |
| Hbar2 | 4.62 | 5.00 | 1.33 | -0.69 | -0.43 |
| Fbar1 | 4.26 | 4.00 | 1.64 | -0.48 | -0.55 |
| Fbar2 | 4.54 | 5.00 | 1.80 | -1.06 | -0.39 |
| Ext2 | 4.13 | 4.00 | 1.40 | -0.52 | 0.08 |
| Ext4 | 4.85 | 5.00 | 1.09 | -0.01 | -0.23 |
| Ext5 | 4.62 | 5.00 | 1.07 | 0.11 | 0.24 |
| Pete1 | 5.03 | 5.00 | 1.63 | -0.33 | -0.73 |
| Pete2 | 4.83 | 5.00 | 1.59 | -0.60 | -0.57 |
| Pete3 | 4.96 | 5.00 | 1.40 | 0.12 | -0.80 |

**Table 5-5 Correlation Matrix for Total Scale Variables (r values) New Zealand**

| | IC | HC | OC | MC | FC | GP | HR | RD | EN | PI | ME | RPO | SF | HB | FB | EE | IP | Per |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Innovation Capability (RC) | | .14 | .10 | .18 | .30** | .35** | .14 | .19* | .16 | .42** | .38** | .13 | .09 | .14 | .21* | .10 | .03 | .13 |
| Human Capability (HC) | | | .61** | .50** | .43** | .26** | .65** | .47** | .30** | .50** | .28** | .05 | .37** | .30** | -.03 | .15 | .01 | .23* |
| Organisational Capability (OC) | | | | .60** | .53** | .20* | .47** | .30** | .32** | .34** | .07 | .02 | .17 | .17 | -.03 | .16 | .17 | .24* |
| Marketing Capability (MC) | | | | | .57** | .21* | .37** | .37** | .35** | .38** | .18 | .12 | .28** | .13 | .10 | .32** | .19* | .01 |
| Financial Capability (FC) | | | | | | .23* | .26** | .28** | .22* | .23* | .06 | .06 | .18 | -.06 | -.34** | .30** | .22* | .05 |
| Government Policies (GP) | | | | | | | .15 | .17 | .09 | .27** | .26** | .18 | .16 | .31** | .14 | .18 | .03 | .05 |
| Human Resources (HR) | | | | | | | | .38** | .26** | .44** | .26** | .03 | .38** | .17 | -.08 | .05 | .04 | .36** |
| Resources Dynamism (RD) | | | | | | | | | .23* | .51** | .24* | .03 | .37** | .23* | -.06 | .20* | .04 | .21* |
| External Relationships/Networks(EN) | | | | | | | | | | .11 | .09 | .02 | .14 | .12 | .08 | .02 | -.00 | -.01 |
| Product Innovation (PI) | | | | | | | | | | | .41** | .15 | .52** | .22** | .02 | .15 | -.01 | .37** |
| Market Expansion (ME) | | | | | | | | | | | | .08 | .11 | .10 | -.07 | .05 | -.13 | .21* |
| Remaining-in-private-ownership (RPO) | | | | | | | | | | | | | -.01 | .03 | .34** | .27** | .02 | -.34 |
| Strategy Flexibility (SF) | | | | | | | | | | | | | | .15 | .04 | .26** | .10 | .12 |
| Human Barriers (HB) | | | | | | | | | | | | | | | .07 | .06 | -.06 | -.14 |
| Financial Barriers (FB) | | | | | | | | | | | | | | | | .31** | .10 | -33** |
| External Effect (EE) | | | | | | | | | | | | | | | | | .11 | -.32** |
| Industry Competition (IP) | | | | | | | | | | | | | | | | | | -.05 |
| Performance (Per) | | | | | | | | | | | | | | | | | | |

***Significant at 0.01level (2-tailed); *Significant at 0.05 level (2-tailed)*

**Table 5-6 Correlation Matrix for Total Scale Variables (r values) Malaysia**

| | IC | HC | OC | MC | FC | GP | HR | RD | EN | PI | ME | RPO | SF | HB | FB | EE | IP | Per |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Innovation Capability (RC) | | .23 | .17 | -.10 | .06 | .28** | .06 | .13 | .00 | .29* | .38** | .32* | .19 | -.03 | .11 | .10 | -.02 | .16 |
| Human Capability (HC) | | | .29* | .28* | .33* | .30* | .46** | .42** | .29* | .38** | .12 | .28* | .42** | .15 | .09 | .26 | .35** | .13 |
| Organisational Capability (OC) | | | | .47** | .47** | .25* | .35* | .34* | .28* | .49** | .30* | .36** | .29* | -.14 | .08 | .40** | .30** | .22 |
| Marketing Capability (MC) | | | | | .64** | .20 | .27 | .26 | .14 | .21 | .06 | .30* | .22 | .26 | .28* | .33** | .37** | -.06 |
| Financial Capability (FC) | | | | | | .12 | .27* | .38** | .26 | .25 | .31* | .34* | .43** | .18 | .28* | .36** | .39** | .08 |
| Government Policies (GP) | | | | | | | .23 | .12 | .17 | .13 | .09 | .33* | .23 | .00 | .29* | .22 | .01 | -.02 |
| Human Resources (HR) | | | | | | | | .50** | .27* | .26 | .16 | .00 | .23 | .10 | -.03 | .03 | .29* | .15 |
| Resources Dynamism (RD) | | | | | | | | | .34* | .37** | .23 | .16 | .28* | .12 | .09 | .40** | .36** | .27 |
| External Relationships/Networks(EN) | | | | | | | | | | .32* | .06 | .12 | .43** | .19 | .06 | .36** | .25 | -.03 |
| Product Innovation (PI) | | | | | | | | | | | .20 | .17 | .34* | -.08 | -.20 | .03 | -.06 | .26 |
| Market Expansion (ME) | | | | | | | | | | | | .17 | .19 | -.04 | .04 | .22 | .11 | .20 |
| Remaining-in-private-ownership (RPO) | | | | | | | | | | | | | .32* | .35* | .46** | .48** | .38** | -.00 |
| Strategy Flexibility (SF) | | | | | | | | | | | | | | .05 | .26 | .37** | .18 | .17 |
| Human Barriers (HB) | | | | | | | | | | | | | | | .43** | .32* | .32* | .02 |
| Financial Barriers (FB) | | | | | | | | | | | | | | | | .57** | .44** | -.22 |
| External Effect (EE) | | | | | | | | | | | | | | | | | .60** | -.09 |
| Industry Competition (IP) | | | | | | | | | | | | | | | | | | -10 |
| Performance (Per) | | | | | | | | | | | | | | | | | | |

***Significant at 0.01level (2-tailed); *Significant at 0.05 level (2-tailed)*

## 5.6 Resource-Capabilities Model

Based on the findings from qualitative interviews in Study 1, government policies, human resources, external relationships/networks and resources dynamism assisted high-performing firms to build up their internal capabilities. With the conceptual model in mind, multiple regression analysis was used to test the predictions in the model. As evidenced in the case studies, governments have assisted some of the firms by providing financial resources, advice and facilities to build up their internal capabilities. This can also be considered as a predictor for the resources dynamism measure. Besides, human resources appear to be a critical resource for technology-based firms because many of their products and services are based on human intelligence. Finally, external relationships/networks provide technology-based firms with useful intangible resources such as knowledge, information and advice. Multiple regressions were conducted therefore to confirm the effects of government policies, external relationships/networks and human resources on resources dynamism.

**Table 5-7 Resources Dynamism Predictors**

| | ***NZ Resources Dynamism*** | | ***MY Resources Dynamism*** | |
|---|---|---|---|---|
| | ***Standardised β*** | ***sig*** | ***Standardised β*** | ***sig*** |
| Government Policies | .10 | .24 | .02 | .86 |
| Human Resources | .33 | .00** | .44 | .00** |
| External Network | .12 | .17 | .22 | .08 |
| $R^2$ | .17 | | .30 | |
| *Adjusted* $R^2$ | .15 | | .26 | |

**p<0.05; ** p<0.01*

Table 5.7 presents the results of the multiple regression analysis in the two countries. Assumptions of non-multicollinearity were checked against the variance inflation factor (VIF) and tolerance values of each measure. All VIFs were well between 1.0-1.1 confirming the regression models were not biased while the tolerances were around 0.9. Residual histogram and normal P-P plots were checked against the dependant variable. Both found the residuals to be normally distributed and fulfil the assumption of the regression model. The result shows that the model was able to explain 16% ($R^2$=0.16) of the variations in New Zealand's resources dynamism. However, the results were slightly different in Malaysia where $R^2$ could explain 30% of the variations. Human resources had a significant effect on resources dynamism in both countries, while government policies and external relationships/networks had no effect at all. Based on the results, Hypothesis 1a and 1c were not supported in either country while Hypothesis

1b, that human resources influence a technology-based firm's ability to use resources dynamically, was fully supported in both countries.

***Transforming Resources to Capabilities***

It was also obvious from the case studies that government policies have successfully built up the innovation capability of several firms. Furthermore, the firms' abilities to dynamically build capabilities from continuous acquisitions, sharing and creating resources were also evidenced in some case studies. Hence, a series of multiple regressions was conducted to evaluate the extent of government policies, external relationships/networks, human resources and resources dynamism in explaining the five capabilities identified in Study 1. The results of the analysis for the five capabilities are presented in Table 5-8. To confirm non-multicollinearity among the variables, collinearity statistics based on VIF and tolerance values were checked. All VIFs were well between 1.0-1.4, confirming the regression models were not biased, while the tolerances were around 0.7-0.9. The residual histogram and normal P-P plots were checked and the assumptions were met in all regression models.

From the table, it was found that 15% of the variation ($R^2$ =.15) in innovation capability was explained by the resources dimensions in New Zealand. Government policies ($p<.001$) had a significant effect on innovation capability. Human resources ($p=.76$), external relationships/networks and resources dynamism ($p=.29$) had no significant effect. Analyses of the Malaysian responses revealed a different result where the regression model explained only 9% ($R^2=.09$) of the variations in innovation capability. However, government ($p=.05$) was found to have a significant effect on the innovation capability in Malaysia. In summary, government policies appear to be important in both countries and have an impact on the innovation capabilities of technology firms.

For human capability, the results showed that 51% ($R^2= .51$) of its variations were explained by the resources dimensions in New Zealand. Human resources ($p<.001$), government policies ($p\leq0.05$) and resources dynamism ($p<.001$) had significant effects, while external relationships/networks had no significant effect ($p=.16$). A similar result was found in Malaysia where the regression explained 31% of the variations in human capability ($R^2=.31$). Although human resources ($p\leq.05$) had a significant effect on human capital, resources dynamism, external relationships/networks and government

policies had no significant effect. The sources of building human capability in both countries were therefore mainly from human resources, while New Zealand's government policies and its firms' abilities to use resources dynamically also affected its human capability.

**Table 5-8 Effects of Resources to Capabilities**

| | ***Standardised β*** | ***sig*** | ***Standardised β*** | ***sig*** |
|---|---|---|---|---|
| ***Innovation Capability*** | ***New Zealand*** | | ***Malaysia*** | |
| Government Policies | .32 | .00** | .28 | .05* |
| Human Resources | .03 | .76 | .05 | .74 |
| Resources Dynamism | .10 | .29 | .15 | .35 |
| External Relationships/Networks | .10 | .29 | .08 | .59 |
| $R^2$ | .15 | | .09 | |
| *Adjusted* $R^2$ | .12 | | .02 | |
| ***Human Capability*** | | | | |
| Government Policies | .13 | .05* | .20 | .12 |
| Human Resources | .52 | .00** | .27 | .05* |
| Resources Dynamism | .23 | .00** | .23 | .11 |
| External Relationships/Networks | .09 | .16 | .10 | .43 |
| $R^2$ | .51 | | .31 | |
| *Adjusted* $R^2$ | .49 | | .25 | |
| ***Marketing Capability*** | | | | |
| Government Policies | .12 | .14 | .15 | .30 |
| Human Resources | .20 | .03* | .15 | .36 |
| Resources Dynamism | .22 | .02* | .16 | .33 |
| External Relationships/Networks | .24 | .00** | .02 | .88 |
| $R^2$ | .26 | | .11 | |
| *Adjusted* $R^2$ | .24 | | .04 | |
| ***Organisational Capability*** | | | | |
| Government Policies | .10 | .20 | .16 | .24 |
| Human Resources | .36 | .00** | .18 | .24 |
| Resources Dynamism | .11 | .26 | .18 | .23 |
| External Relationships/Networks | .19 | .03* | .14 | .31 |
| $R^2$ | .28 | | .20 | |
| *Adjusted R2* | .26 | | .14 | |
| ***Financial Capability*** | | | | |
| Government Policies | .17 | .07 | .04 | .76 |
| Human Resources | .13 | .19 | .08 | .59 |
| Resources Dynamism | .19 | .05* | .32 | .05* |
| External Relationships/Networks | .13 | .16 | .13 | .36 |
| $R^2$ | .15 | | .17 | |
| *Adjusted* $R^2$ | .12 | | .10 | |

**p<0.05; ** p<0.001*

In New Zealand, marketing capability had a slightly lower $R^2$ value where 26% of the variation could be explained by the resources dimension ($R^2$ =.26). Government policies (p=.14) had no significant effect on this capability but human resources (p<.05), resources dynamism (p<.05) and external relationships/networks (p<.001) had significant effects. On the other hand, the four resource variables had no significant effect on marketing capability in Malaysia, but the regression was able to explain 11% of the variations ($R^2$ =.11) in marketing capability. Consequently, it can be concluded

that the three types of resources identified in Study 1 provide little insight into the development of marketing capability in Malaysia.

For organisational capability, the New Zealand results showed that 28% ($R^2$=.28) of its variations were explained by the resources dimensions. Human resources (p<.001) and external relationships/networks (p<.05) had significant effects while government and resources dynamism had no significant effect. In a result similar to that for marketing capability, the four resource variables had no effect on organisation capability in Malaysia, but the regression model was able to explain 20% of the variations ($R^2$ =.20). Thus, human resources and external relationships/networks had significant effect on the organisational capability of New Zealand firms, while none of the resources identified in Study 1 could explain this capability in Malaysia.

Finally, only 15% of the variations in financial capability were explained by the resource dimensions ($R^2$=.15) in New Zealand. Resources dynamism (p<.05) had significant effect on financial capability while external relationships/networks, human resources and government had no significant effect. Similar results were found in the Malaysian samples. The regression model explained 17% of the variations ($R^2$=.17). Resources dynamism (p<.05) also had a significant effect while human resources, external relationships/networks and government had no significant effect on financial capability. Therefore, the results indicate that a firm's ability to use resources dynamically can have a positive impact on its financial capability.

**Table 5-9 Summary of Hypothesis 2**

| ***Resource/ Capability*** | ***Innovation*** | | ***Human*** | | ***Marketing*** | | ***Organisational*** | | ***Financial*** | |
|---|---|---|---|---|---|---|---|---|---|---|
| | ***NZ*** | ***MY*** | ***NZ*** | ***MY*** | ***NZ*** | ***MY*** | ***NZ*** | ***MY*** | ***NZ*** | ***MY*** |
| 2a (GP) | ✓ | ✓ | ✓ | x | x | x | x | x | x | x |
| 2b (HR) | x | x | ✓ | ✓ | ✓ | x | ✓ | x | x | x |
| 2c (RD) | x | x | ✓ | x | ✓ | x | x | x | ✓ | ✓ |
| 2d (EN) | x | x | x | x | ✓ | x | ✓ | x | x | x |

Based on the above results, the four sub-hypotheses developed in Hypothesis 2 could be verified. Table 5-9 shows the summary of results for Hypothesis 2. First of all, it was found that government policies had a significant positive relationship to innovation capability in both countries and to human capability in New Zealand. They had no effect at all on the other capabilities. Secondly, human resources were significantly

related to human capability in both countries but to marketing and organisational capability only in New Zealand. Conversely resources dynamism was found to have significant relationship to human capability and marketing capability in New Zealand, and to financial capability in both countries. Finally, external relationships/networks were found to have a significant relationship to marketing and organisational capabilities only in New Zealand. They had no significant impact in Malaysia. These mixed results can only indicate that for both countries Hypothesis 2 is only partly supported.

### 5.7 Capabilities-Strategies Model

Study 1 and the exploratory factor analysis confirmed four major growth strategies used by technology-based firms in both countries: product innovation, market expansion, remaining-in-private-ownership, and strategy flexibility. It was hypothesised that the capabilities found in both countries helped to develop the strategies mentioned. Regression analyses were run to verify the relationship between capability and strategy. Table 5-10 presents the results for the two countries. Assumptions of non-multicollinearity were checked against the VIF and tolerance values of each measure. All VIFs were well below 10, confirming the regression models were not biased, while the tolerances were around 0.5-0.9. Residual histogram and normal P-P plots were checked against the dependant variable. Both found the residuals to be normally distributed and to fulfil the assumption of the regression model.

From the table, it was found that the capabilities dimension significantly explained 25% of variations in market expansion strategy implemented by New Zealand samples ($R^2$=.25). Innovation capability (p<.001) and human capability (p<.001) had significant effect on the strategy while marketing, financial and organisational capabilities had no significant effect. Similar results were found in the Malaysian samples. The regression model explained 25% of variations in market expansion strategy ($R^2$=.25). However, only innovation capability (p<.05) had a significant effect on this strategy. No relationship was observed between the other capabilities and marketing expansion strategy in Malaysia. It appears therefore that innovation capability is an important element in the market expansion initiatives of technology-based firms in both countries.

**Table 5-10 Effects of Capabilities to Strategies**

| | *Standardised β* | *sig* | *Standardised β* | *sig* |
|---|---|---|---|---|
| ***Market Expansion Strategy*** | ***New Zealand*** | | ***Malaysia*** | |
| Innovation Capability | .38 | .00** | .35 | .01* |
| Human Capability | .34 | .00** | .08 | .57 |
| Organisational Capability | .17 | .17 | . 16 | .28 |
| Marketing Capability | .15 | .15 | .04 | .82 |
| Financial Capability | .21 | .07 | .26 | .11 |
| $R^2$ | .25 | | .25 | |
| *Adjusted* $R^2$ | .21 | | .17 | |
| ***Product Innovation Strategy*** | | | | |
| Innovation Capability | .38 | .00** | .18 | .17 |
| Human Capability | .41 | . 00** | .23 | .10 |
| Organisational Capability | .04 | .72 | .40 | .00** |
| Marketing Capability | .21 | .05* | .02 | .88 |
| Financial Capability | .20 | .06 | .03 | .84 |
| $R^2$ | .41 | | .33 | |
| *Adjusted* $R^2$ | .38 | | .26 | |
| **Remaining-in-private-ownership** | | | | |
| Innovation Capability | -.12 | .26 | -.29 | .04* |
| Human Capability | -.03 | .83 | -.08 | .54 |
| Organisational Capability | .08 | .54 | -.16 | .30 |
| Marketing Capability | -.14 | .28 | .14 | .41 |
| Financial Capability | .22 | .86 | -.12 | .47 |
| $R^2$ | .03 | | .26 | |
| *Adjusted* $R^2$ | -.02 | | .18 | |
| **Strategy Flexibility** | | | | |
| Innovation Capability | .03 | .75 | .07 | .57 |
| Human Capability | .37 | .00** | .28 | .03* |
| Organisational Capability | -.17 | .19 | .08 | .59 |
| Marketing Capability | .21 | .09 | -.12 | .46 |
| Financial Capability | -02 | .87 | .37 | .03* |
| $R^2$ | .16 | | .29 | |
| *Adjusted* $R^2$ | .12 | | .21 | |

**p<0.05; ** p<0.001*

The regression model for product innovation strategy shows that 41% of its variations ($R^2$=.41) can be explained by the capabilities dimension in New Zealand. Three of the capabilities were found to be significantly related to product innovation strategy. Innovation capability (p<.001), human capability (p<.001) and marketing capability (p≤.05) had significant effects on product innovation strategies implemented by New Zealand technology-based firms. Malaysia's regression model revealed a contradictory result. Its product innovation strategy had $R^2$ value of 0.33 where 33% of its variations were explained by the capabilities dimension. However, only organisational capability (p<.001) had a significant effect on the strategy while the other capabilities had no significant effect at all.

Results from the remaining-in-private-ownership regression model show that only organisational and financial capabilities have positive relationships with a New Zealand firm's decision to remain in private ownership, however the relationships were not significant. This model did not explain well the variation of the decision as the $R^2$ value was very low. On the other hand, there was a slightly higher $R^2$ value in Malaysia where 26% of the variations can be explained by the capabilities dimension. Among the capabilities, only innovation capability was found to have a significant but negative relationship. Findings from Study 1 suggest that lack of capabilities was the motivation for opening up private ownership. In other words, firms that have strong internal capabilities are more incline to remaining-in-private-ownership. Nevertheless, results from the survey show that firms that have innovation capability in Malaysia are more likely to be acquired or offer themselves for public ownership. Thus Hypothesis 7a is not supported in both countries.

Finally, the regression model for strategy flexibility indicated that 16% of its variations ($R^2$=.16) can be explained by the capabilities dimension. It was found that only human capability had a significant relationship with this strategy. Conversely, it appears that the model explained Malaysian firms better than New Zealand ones, with higher $R^2$ value ($R^2$=.29). Human capability and financial capability were found to have significant relationships with this strategy. This might suggest that technology-based firms are more likely to make changes to their strategies if they have strong human and financial capabilities. This is reasonable because a firm needs to have sufficient human capability if it needs to implement different strategies over a short period of time.

**Table 5-11 Summary of Hypothesis Three (a), Five, Seven (a) and Nine (a)**

| ***Capability/Strategy*** | ***Market Expansion*** | | ***Product Innovation*** | | ***Remain Private ownership*** | | ***Strategy Flexibility*** | |
|---|---|---|---|---|---|---|---|---|
| | ***NZ*** | ***MY*** | ***NZ*** | ***MY*** | ***NZ*** | ***MY*** | ***NZ*** | ***MY*** |
| Innovation Capability | ✓ | ✓ | ✓ | x | x | x | x | x |
| Human Capability | ✓ | x | ✓ | x | x | x | ✓ | ✓ |
| Organisational Capability | x | x | x | ✓ | x | x | x | x |
| Marketing Capability | x | x | ✓ | x | x | x | x | x |
| Financial Capability | x | x | x | x | x | x | x | ✓ |

Table 5-11 summarises the relationship between capabilities and strategy. From the results it seems that not all the capabilities related to strategies implemented by technology-based firms. Innovation capability strongly influenced market expansion

strategies in both countries, and product innovation strategy in New Zealand only. This is consistent with Study 1, which found global firms started up in New Zealand that had successfully sold their innovations to overseas markets. Study 1 also revealed that there were more Malaysian high-growing firms opting for initial public listing. Human capability had a significant influence on market expansion, product innovation strategy and strategy flexibility in New Zealand. This could imply that New Zealand capitalised more on its people skills to deliver innovative products/services and expand its markets as well as showing flexibility in adopting different strategies. Conversely, organisational capability had a positive significant influence on product innovation strategy in Malaysia only. This was the only capability that significantly influenced product innovation strategy in Malaysia. Thus it may be assumed that innovation initiatives in Malaysia are strongly influenced by their organisational structures, culture and management behaviour. In New Zealand, marketing capability was significantly related only to product innovation strategy. This finding is quite unusual, as marketing capability is often linked to market expansion strategy. However, items used to measure marketing capability included the firm's understanding of customer needs and how to fulfil them; therefore it is logical that marketing capability did influence the implementation of product innovation strategies. Finally, financial capability did not appear to influence strategies implementation at all, except in terms of adopting a flexible strategy in Malaysia. The implication is that technology-based firms in both countries would use market expansion or product innovation strategies regardless of their financial capability. Malaysian firms were more likely to adopt different strategies based on environment change if they had sufficient financial capability. Again, the mixed results from the analyses can only suggest that all the related hypotheses are partially supported in both countries.

### 5.8 Performance Model

In the hypothesised model developed from Study 1, it was found that the growth performance of technology-based firms was strongly influenced by their strategies, external environment effects, financial barriers and human capital barriers. Regression analyses were again run to check the relationships between performance and the growth factors identified. Assumptions of non-multicollinearity were also checked against the VIF and tolerance values of each measure. All VIFs were well between 1.0-1.7,

confirming the regression models were not biased, while the tolerances were around 0.5-0.9. Residual histogram and normal P-P plots were checked against the dependent variable. Both found the residuals to be normally distributed and fulfil the assumption of the regression model. The regressions results are tabulated in Table 5-12.

**Table 5-12 Summary of Performance Model**

| | ***Standardised β*** | ***Sig*** | ***Standardised β*** | ***sig*** |
|---|---|---|---|---|
| | ***New Zealand*** | | ***Malaysia*** | |
| Product Innovation Strategy(H4) | .46 | .00** | .11 | .48 |
| Market Expansion Strategy (H6) | .02 | .81 | .18 | .20 |
| Remaining-in-private-ownership (H8) | .28 | .00** | .00 | .99 |
| Strategy Flexibility (H9) | -.07 | .42 | .20 | .23 |
| Financial Barriers (H12) | -.19 | .03* | -.26 | .17 |
| Human Capital Barriers (H11) | -.08 | .31 | -.19 | .24 |
| Industry Competition (H10a) | 02 | .79 | -.03 | .85 |
| External Effect(H10b) | -.25 | .04* | -.10 | .61 |
| $R^2$ | .41 | | .17 | |
| *Adjusted* $R^2$ | .37 | | .03 | |

**p<0.05; ** p<0.001*

From these results it can be seen that the model was better explained in the New Zealand context. It was found that 41% of the performance variations ($R^2$=.41) were explained well by the model. The factors that influenced performance in New Zealand were product innovation strategy (p<.001), remaining-in-private-ownership (p<.001), external effects (p<.05) and financial barriers (p<.05). Product innovation strategy and remaining-in-private-ownership related positively to performance while external effect and financial barriers related negatively. Negative coefficients values indicated negative relationships between the two variables. It is surprising to see that the decision to remain in private ownership had a positive relationship with performance. The case studies revealed that most of the interviewed firms that decided on acquisition or public ownership did so to acquire more resources for growth. However, complications in the changes of ownership could have impacted growth performance in a negative way. For this reason, Hypothesis 8 was rejected in the case of New Zealand although the relationship was significant. Human capital barriers, market expansion strategy, industry competition and strategy flexibility had no significant effect on performance. Thus, only Hypothesis 4a, Hypothesis 10b and Hypothesis 12 were supported in the case of New Zealand. On the other hand, the performance model was not well explained in the context of Malaysia. The regression model explained only 17% of the variations of performance measures. None of the independent variables had any

significant relationship with performance. This could be due to the small sample size (N=53) in Malaysia affecting its ability to explain the hypothesised growth model. As a result, the relevant hypotheses were not supported in the Malaysian context.

From the results of the three models hypothesised from Study 1, Table 5-13 below summarises the hypotheses results based on country.

**Table 5-13 Summaries of Hypotheses**

| | ***Hypothesis*** | ***New Zealand*** | ***Malaysia*** |
|---|---|---|---|
| $H_{1a}$ | Government policies influence technology-based firms' ability to use resources dynamically (resources dynamism). | x | x |
| $H_{1b}$ | Human resources influence technology-based firms' ability to use resources dynamically (resources dynamism). | ✓ | ✓ |
| $H_{1c}$ | External relationships/networks influence technology-based firms' ability to use resources dynamically (resources dynamism). | x | x |
| $H_{2a}$ | Government policies are related positively to the capabilities of technology-based firms. | $✓_p$ | $✓_p$ |
| $H_{2b}$ | Human resources are related positively to the capabilities of technology-based firms. | $✓_p$ | $✓_p$ |
| $H_{2c}$ | Resources dynamism are related positively to the capabilities of technology-based firms. | $✓_p$ | $✓_p$ |
| $H_{2d}$ | External relationships/networks are related positively to the capabilities of technology-based firms. | $✓_p$ | $✓_p$ |
| $H_{3a}$ | Internal capabilities are related positively to the product innovation strategy of technology-based firms. | $✓_p$ | $✓_p$ |
| $H_{3b}$ | Internal capabilities are related positively to the niche focus strategy of technology-based firms. | n/a | n/a |
| $H_{4a}$ | Product Innovation strategy is related positively to the performance of technology-based firms. | ✓ | x |
| $H_{4b}$ | Niche-focus strategy is related positively to the performance of technology-based firms. | n/a | n/a |
| $H_5$ | Internal capabilities are related positively to the market expansion strategy of technology-based firms. | $✓_p$ | $✓_p$ |
| $H_6$ | Market expansion strategy is related positively to the performance of technology-based firms. | x | x |
| $H_{7a}$ | Internal capabilities are related positively to the remaining-in-private-ownership strategy of technology-based firms. | x | x |
| $H_{7b}$ | Internal capabilities are related negatively to the acquisition strategy of technology-based firms. | n/a | n/a |
| $H_{8a}$ | The remaining-in-private-ownership strategy is related negatively to the performance of technology-based firms. | x | x |
| $H_{8b}$ | Acquisition strategy is related positively to the performance of technology-based firms. | n/a | n/a |
| $H_{9a}$ | Internal capabilities are related positively to the strategy flexibility of technology-based firms. | $✓_p$ | $✓_p$ |
| $H_{9b}$ | Strategy flexibility is related positively to the performance of technology-based firms. | x | x |
| $H_{10a}$ | Industry competition affects the performance of technology-based firms. | x | x |
| $H_{10b}$ | External environment affects the performance of technology-based firms. | ✓ | x |
| $H_{11}$ | Human capital is related positively to the performance of technology-based firms. | x | x |
| $H_{12}$ | Available finance is related positively to the performance of technology-based firms. | ✓ | x |

*$✓_p$ indicates a partial support for the hypothesis; n/a: not available*

## 5.9 Path Analysis of the Regressed Model

As multiple regression analysis only evaluated each component model separately and could not examine the path effects, path analysis based on the Partial Least Squares approach is used. It aims to check the dependence relationship and relative importance between variables. The results from regression analysis showed that the model could not provide significant explanations in the Malaysian context, therefore the path analysis method will only apply here to the regressed model of New Zealand. Two factors, strategy flexibility and human resources barriers, were dropped from the analysis because they did not relate significantly to performance. Relationships that were insignificant from the regression model analysis are not included in this path analysis. As mentioned in Section 5.1, analyses using the PLS approach were also used on all responses from the aggregated high-growth and non-high-growth firms of both countries. The results can be found in Appendix I. The similarities and differences in the path models of different samples are discussed in the appendix. It is important to note that the same procedures were applied to each group as explained in the following sections.

The hypothesised model developed from Study 1 used two types of indicators/constructs to measure different types of variables. Formative indicators were used in the performance variables. Therefore, these variables are recognised as formative constructs where their indicators are not assumed to be correlated, and they do not cause the creation or change in the construct. On the other hand, reflective indicators were developed to capture the capabilities, resources, strategies and barriers variables. The changes in these reflective constructs should be reflected by changes in all of its indicators. Thus the indicators are assumed to be highly correlated. After confirming the related indicators for each variable in the previous section, the following sections discuss the use of Partial Least Squares (PLS) to evaluate the measure and structural dimensions of the hypothesised model.

### *5.9.1 Measurement Model*

First of all, it is important to check whether the variables and the constructs used are accurate and reliable in the measurement model. As there were two types of constructs, formative and reflective, used in this study, several sets of procedures based on the type

of construct were conducted. After the validity and reliability of the measurement model are confirmed, analyses of the structural model are conducted and explained.

### *Formative Construct*

There was only one formative construct used in this study: performance. It is assumed that return on asset (ROA), return on equity (ROE) and sales growth built up the performance construct for technology-based firms. Based on the interviews in Study 1, firms frequently use these three measures to evaluate performance. As formative constructs are multidimensional, it is meaningless to conduct reliability checks. Thus, content validity is discussed on the formative construct in this study. Based on Table 5-14, all the three items have very high T-statistics value and they are all significant. Thus, all items were valid in the study and the inter-constructs correlations tabulated in Table 5-15 also show that the three items had high cross-loadings with the performance construct.

**Table 5-14 Formative Constructs Outer Model Weights**

| *Construct and items* | *Weight* | *Std Error* | *T-statistic* |
|---|---|---|---|
| **Performance** | | | |
| ROA | 0.0503 | 0.1102 | 6.9085** |
| ROE | 0.4644 | 0.1041 | 7.6519** |
| Sales Growth | 0.6638 | 0.1044 | 8.5341** |

***p<0.001*

### *Reflective Constructs*

In order to assess the reflective constructs measurement model, it is important to measure the validity and reliability of constructs used in the study. Firstly, there are two important criteria for assessing the validity of reflective constructs: convergent validity and discriminant validity. According to Chin (2010), convergent validity is defined as the extent to which a block of items strongly agree/correlate in their representation of the underlying construct they were created to measure. In the same context, discriminant validity occurs when the block of items has low correlations with all the other constructs except their associated constructs (Gefen & Straub 2005). As shown in Table 5-15, all the items in the reflective constructs were more strongly correlated to its construct column than any other construct column. This shows that all constructs share more variance with their measures than with other constructs. Furthermore, the item loadings on associated constructs were around 0.7 to 0.9 for all items except Ocap3, Mcap2 and Fbar1. The exploratory factor analysis conducted earlier in SPSS has

confirmed the items validity in their assigned factors. Therefore, the validity of the reflective constructs outer model can be confirmed in PLS analysis.

**Table 5-15 Outer Model Loadings and Cross-Loadings**

| Items | IC | HC | OC | MC | FC | GP | HR | RD | PI | ME | FPO | EN | FB | EE | Perf |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Icap1 | **.86** | .10 | -.00 | .12 | .23 | .41 | .00 | .17 | .34 | .31 | .05 | .18 | .21 | .06 | .10 |
| Icap2 | **.93** | .09 | .04 | .11 | .24 | .27 | .07 | .14 | .35 | .37 | .13 | .15 | .10 | .04 | .05 |
| Icap3 | **.81** | .18 | .21 | .25 | .25 | .25 | .27 | .23 | .41 | .31 | .19 | .14 | .06 | .06 | .16 |
| Hcap1 | .01 | **.91** | .51 | .38 | .34 | .26 | .55 | .40 | .43 | .28 | .07 | .26 | -.03 | .10 | .19 |
| Hcap2 | .12 | **.90** | .53 | .40 | .38 | .28 | .55 | .40 | .42 | .27 | .05 | .32 | -.01 | .07 | .26 |
| Hcap3 | .18 | **.91** | .54 | .49 | .40 | .29 | .64 | .46 | .49 | .32 | .09 | .26 | -.12 | .07 | .28 |
| Hcap4 | .10 | **.86** | .62 | .52 | .50 | .19 | .62 | .45 | .47 | .14 | .01 | .25 | -.00 | .16 | .22 |
| Ocap1 | .12 | .55 | **.82** | .41 | .45 | .23 | .43 | .29 | .30 | .06 | .05 | .28 | .04 | .09 | .23 |
| Ocap2 | .02 | .40 | **.78** | .44 | .45 | .17 | .41 | .18 | .14 | .04 | .23 | .22 | -.03 | .05 | .15 |
| Ocap3 | .11 | .40 | **.68** | .55 | .43 | .12 | .25 | .22 | .26 | .01 | .10 | .31 | .16 | .26 | .10 |
| Ocap4 | .03 | .50 | **.77** | .49 | .39 | .14 | .38 | .27 | .28 | .00 | -.11 | .23 | -.04 | .12 | .21 |
| Ocap5 | .14 | .51 | **.82** | .47 | .43 | .15 | .43 | .26 | .30 | .14 | .03 | .25 | -.16 | -.03 | .33 |
| Mcap1 | .21 | .28 | .44 | **.79** | .43 | .09 | .33 | .33 | .33 | .02 | -.08 | .25 | .22 | .22 | .12 |
| Mcap2 | .03 | .28 | .31 | **.63** | .34 | .12 | .24 | .22 | .20 | .05 | -.03 | .07 | .18 | .16 | .07 |
| Mcap4 | .09 | .28 | .35 | **.71** | .36 | .12 | .21 | .29 | .23 | .26 | .15 | .24 | -.04 | .15 | .00 |
| Mcap5 | .15 | .58 | .59 | **.78** | .57 | .32 | .36 | .28 | .34 | .23 | .12 | .44 | .06 | .31 | .10 |
| Fcap1 | .16 | .34 | .45 | .46 | **.87** | .12 | .18 | .23 | .17 | .00 | .05 | .15 | .27 | .23 | .07 |
| Fcap2 | .20 | .50 | .59 | .54 | **.88** | .24 | .30 | .30 | .28 | .10 | .01 | .31 | .08 | .21 | .09 |
| Fcap3 | .39 | .30 | .27 | 35 | **.70** | .27 | .12 | .13 | .20 | .11 | .26 | .14 | .39 | .18 | .04 |
| Fcap4 | .19 | .29 | .42 | .46 | **.80** | .10 | .24 | .22 | .10 | .06 | -.01 | .22 | .33 | .32 | .12 |
| Fcap5 | .23 | .37 | .46 | .56 | **.83** | .21 | .21 | .28 | .15 | .13 | -.05 | .14 | .15 | .20 | .00 |
| Gov1 | .36 | .34 | .24 | .26 | .25 | **.95** | .23 | .20 | .34 | .26 | .22 | .15 | .18 | .14 | .09 |
| Gov2 | .30 | .14 | .14 | .14 | .17 | **.89** | .08 | .12 | .17 | .13 | .16 | .06 | .07 | .09 | .02 |
| HR2 | .13 | .54 | .32 | .23 | .22 | **.**10 | **.82** | .31 | .32 | .27 | .07 | .26 | -.08 | .06 | .24 |
| HR3 | .10 | .61 | .53 | .44 | .24 | .21 | **.91** | .37 | .47 | .15 | -.03 | .20 | -.14 | -.05 | .44 |
| Res1 | .16 | .41 | .25 | .23 | .21 | .13 | .33 | **.78** | .35 | .21 | .02 | .23 | -.05 | .17 | .19 |
| Res2 | .01 | .28 | .17 | .29 | .24 | .13 | .21 | **.74** | .28 | .06 | -.13 | .22 | -.07 | .08 | .14 |
| Res3 | .27 | .39 | .29 | .37 | .22 | .16 | .36 | **.78** | .56 | .30 | .06 | .01 | -.08 | .26 | .19 |
| Inn1 | .26 | .36 | .33 | .34 | .22 | .19 | .32 | .49 | **.77** | .30 | .08 | .13 | -.04 | .19 | .28 |
| Inn2 | .46 | .39 | .18 | .34 | .20 | .34 | .34 | .47 | **.88** | .40 | .13 | .05 | .09 | .16 | .31 |
| Inn4 | .31 | .49 | .32 | .27 | .15 | .19 | .47 | .37 | **.82** | .36 | .16 | .11 | -.00 | -.03 | .41 |
| Exp1 | .32 | .18 | .01 | .07 | .00 | .24 | .09 | .13 | .28 | **.76** | .17 | .09 | -.15 | -.02 | .15 |
| Exp3 | .31 | .10 | .04 | .01 | .01 | .15 | .09 | .11 | .27 | **.80** | -.02 | .01 | -.07 | -.10 | .29 |
| Exp4 | .24 | .37 | .20 | .32 | .18 | .19 | .31 | .35 | .42 | **.73** | .03 | .15 | -.07 | .13 | .17 |
| PAC1 | .20 | .09 | -01. | .11 | .07 | .25 | .00 | -.11 | .12 | .17 | **.93** | .12 | .29 | .25 | -.35 |
| PAC4 | .01 | .00 | .04 | .12 | -.03 | .15 | .02 | .07 | .15 | -.09 | **.82** | -.06 | .29 | .26 | -.23 |
| Ntw1 | .23 | .28 | .33 | .36 | .26 | .03 | .25 | .12 | .18 | .14 | .11 | **.88** | .08 | .11 | .00 |
| Ntw2 | .04 | .22 | .21 | .27 | .13 | .19 | .18 | .22 | .00 | .00 | -.05 | **.80** | .02 | -.07 | -.04 |
| Fbar1 | .06 | -.04 | -.02 | .18 | .21 | .13 | -.17 | -.05 | .01 | -.20 | .27 | .04 | **.96** | .35 | -.36 |
| Fbar2 | .31 | -.02 | -.01 | .02 | .28 | .14 | -.02 | -.05 | .04 | .11 | .31 | .05 | **.69** | .16 | -.15 |
| Ext2 | .05 | -.04 | -.02 | .17 | .23 | .04 | -.12 | .02 | -.03 | -.13 | .25 | -.00 | .12 | **.84** | -.33 |
| Ext4 | 13 | .17 | .19 | .28 | .23 | .11 | .12 | .24 | .18 | -.02 | .05 | .03 | .12 | **.74** | -.16 |
| Ext5 | .00 | .20 | .15 | .29 | .20 | .16 | .05 | .33 | .19 | .15 | .31 | .07 | .05 | **.79** | -.29 |
| ROA | .15 | .14 | .19 | .03 | .06 | .05 | .28 | .12 | .27 | .16 | -.33 | -.01 | -.35 | -.30 | **.76** |
| ROE | .05 | .13 | .18 | .00 | .10 | .05 | .30 | .21 | .33 | .15 | -.35 | -.06 | -.36 | -.26 | **.80** |
| SalesGr | .13 | .30 | .27 | .11 | .05 | .14 | .38 | .20 | .37 | .29 | -.22 | .04 | -.23 | -.32 | **.89** |

Secondly, the reliability of reflective constructs is examined by checking on the items loading, composite reliability and average variance extracted (AVE). Item loadings would verify that the item is a reliable and its variance can be explained by the latent construct of at least 50%. Thus the correlation between the construct and each of its indicators should be at least 0.7. According to Hensler, Ringle & Sinkovics (2009), if a reflective indicator has lower than 0.4 loading it should be eliminated. The results presented in Table 5-16 show no item with such a low loading. The composite reliability for all constructs exceeded 0.7, well above the minimum threshold of 0.6.

Chin (2010) suggests the ideal AVE should be greater than 0.5, meaning that variance of the indicators of 50% or more should be accounted for. The constructs used have fulfilled this requirement. Thus the construct reliability of the reflective constructs is verified in this study.

**Table 5-16 Reflective Constructs Outer Model Loadings**

| Construct and items | Loadings | Composite Reliability | AVE |
|---|---|---|---|
| ***Government*** | | **0.945** | **0.896** |
| Gov1 | 0.951 | | |
| Gov2 | 0.891 | | |
| ***Resources Dynamism*** | | **0.834** | **0.626** |
| Res1 | 0.788 | | |
| Res2 | 0.751 | | |
| Res3 | 0.765 | | |
| ***Human Resources*** | | **0.871** | **0.772** |
| HR2 | 0.823 | | |
| HR3 | 0.907 | | |
| ***External Relationships/Networks*** | | **0.832** | **0.712** |
| Ntw1 | 0.879 | | |
| Ntw2 | 0.794 | | |
| ***Innovation Capability*** | | | |
| Icap1 | 0.866 | **0.910** | **0.771** |
| Icap2 | 0.926 | | |
| Icap3 | 0.808 | | |
| ***Human Capability*** | | | |
| Hcap1 | 0.907 | **0.932** | **0.775** |
| Hcap2 | 0.905 | | |
| Hcap3 | 0.916 | | |
| Hcap4 | 0.861 | | |
| ***Organisational Capability*** | | **0.879** | **0.593** |
| Ocap1 | 0.821 | | |
| Ocap2 | 0.769 | | |
| Ocap3 | 0.700 | | |
| Ocap4 | 0.767 | | |
| Ocap5 | 0.809 | | |
| ***Marketing Capability*** | | **0.822** | **0.537** |
| Mcap1 | 0.781 | | |
| Mcap2 | 0.592 | | |
| Mcap4 | 0.715 | | |
| Mcap5 | 0.802 | | |
| ***Financial Capability*** | | **0.917** | **0.708** |
| Fcap1 | 0.873 | | |
| Fcap2 | 0.874 | | |
| Fcap3 | 0.675 | | |
| Fcap4 | 0.811 | | |
| Fcap5 | 0.840 | | |
| ***Product Innovation*** | | **0.873** | **0.696** |
| Inn1 | 0.767 | | |
| Inn2 | 0.873 | | |
| Inn4 | 0.818 | | |
| ***Market Expansion*** | | **0.801** | **0.574** |
| Exp1 | 0.752 | | |
| Exp3 | 0.726 | | |
| Exp4 | 0.805 | | |

| Construct and items | Loadings | Composite Reliability | AVE |
|---|---|---|---|
| ***Remaining-in-private-ownership*** | | **0.878** | **0.783** |
| PAC1 | | | |
| PAC4 | 0.926 | | |
| ***Financial Barriers*** | 0.821 | | |
| Fbar1 | | **0.823** | **0.705** |
| Fbar2 | 0.945 | | |
| ***External Effects*** | 0.712 | | |
| Ext2 | | **0.839** | **0.635** |
| Ext4 | 0.845 | | |
| Ext5 | 0.779 | | |
| | 0.735 | | |

### *5.9.2 Structural Model*

Next, the structural model was assessed to establish the significance of all path estimates. The path analysis for the structural model is presented in Figure 5.1. The number on each arrow indicates the path coefficients, while the number on the construct circle represents the $R^2$ value. Path significance was generated by bootstrap from the PLS-graph. The bootstrap approach is useful for calculating the precision of the PLS estimates (Chin 2010). N (in this case N=500) sample sets were created to obtain 500 estimates for each parameter in the model. The sample was derived by re-sampling from the original data set. Path significance was calculated by calculating the 500 estimates for each parameter.

It is observed that all the significant relationships identified from the regression models in Section 5.5 to 5.7 were found to be significant in PLS path analysis. Although it was found that market expansion strategy had no significant relationship with performance, it was still included in the analysis of the structural model. This is because this growth strategy could still contribute to $R^2$ value, which in this case was .450. As a result, path analysis revealed that almost 45% of the variations in the performance of technology-based firms in New Zealand were explained by this structural model. The $R^2$ value was slightly higher than the regression model of performance explained in Section 5.7. This is because the structural model path analysis accounted for all the structural path effects while the regression model only counted the independent variables assumed to have direct effects on performance. The path analysis included only significant relationships for the variables, thus the $R^2$ values for some of the constructs were slightly lower than those in the regression analysis, especially the endogenous constructs in resource-capabilities and capabilities-strategies models. Nevertheless, the significance paths generated from the PLS-graph were consistent with those found in regression analysis.

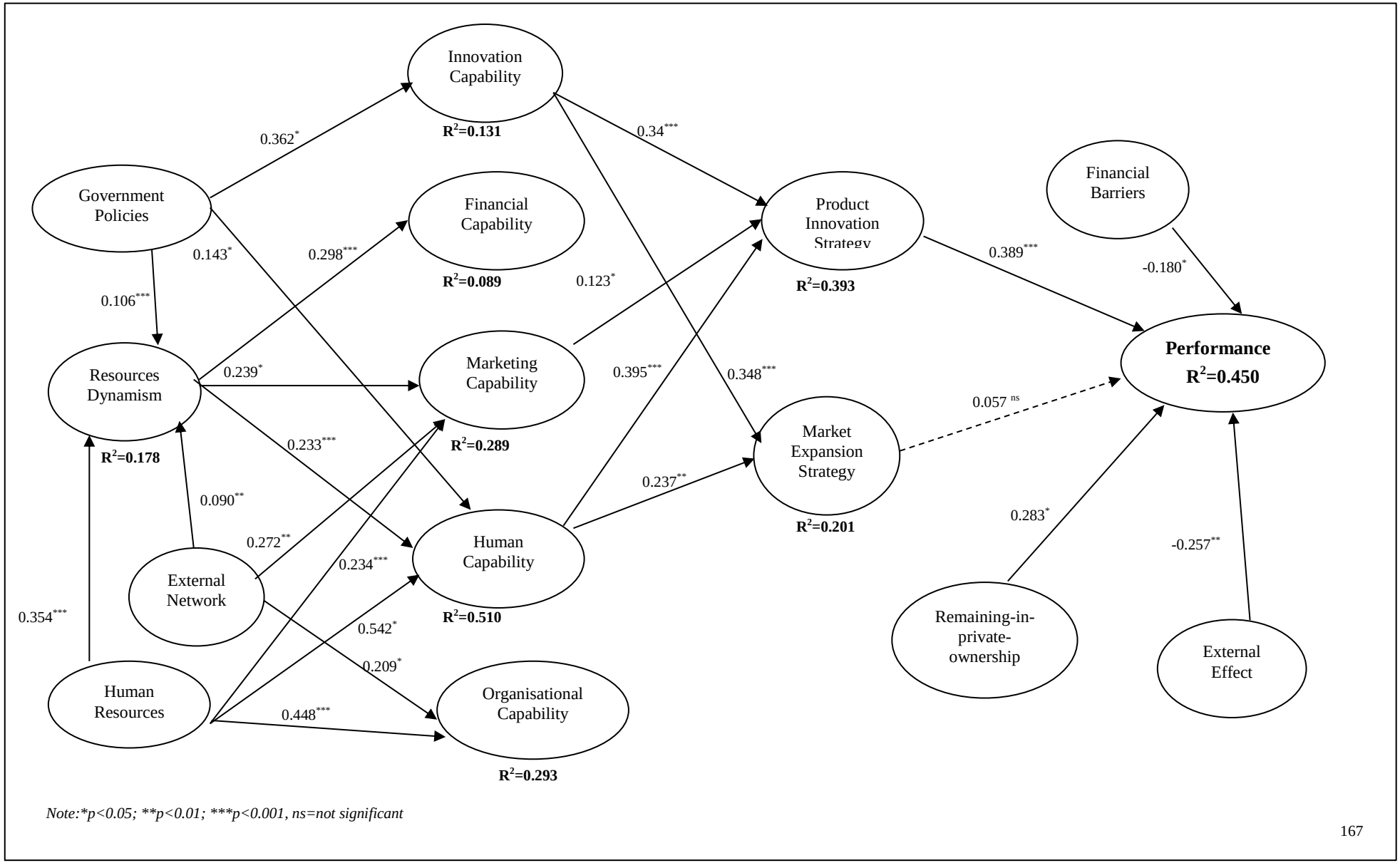
As well as generating path analysis based on the regression results, the study also evaluated path analysis on several structural paths which were found non-significant in the regression model. It was found that several variables which had no significant relationship in the regression model had significant structural paths. This is because PLS-path analysis took into account the individual effect of each particular independent variable. Furthermore, it is important to note that each variable was computed from its indicators based on equal weightage in regression analysis, while the calculations in the PLS-graph were based on loading weightage. This might result in a slightly different outcome. The structural model considered only significant relationships found in both regression analysis and path analysis. Table 5-17 summarises the results from path analysis based on regression analysis results and all other possible structural paths in the model.

**Table 5-17 Summaries of Results for the Structural Model**

| ***Structural Path*** | ***Path coefficients*** | ***Significance*** |
|---|---|---|
| **Based on Regression Analysis** | | |
| Government Policies →Resources Dynamism | 0.106 | p<0.001 |
| Human Resources → Resources Dynamism | 0.354 | p<0.001 |
| External Network→ Resources Dynamism | 0.090 | p<0.01 |
| Government Policies → Innovation capability | 0.362 | p<0.05 |
| Government Policies →Human Capability | 0.143 | p<0.05 |
| Resources Dynamism → Marketing Capability | 0.239 | p<0.05 |
| Resources Dynamism → Financial Capability | 0.298 | p<0.001 |
| Resources Dynamism → Human Capability | 0.234 | p<0.001 |
| Human Resources → Human Capability | 0.542 | p<0.01 |
| Human Resources → Organisational Capability | 0.448 | p<0.001 |
| Human Resources →Marketing Capability | 0.234 | p<0.001 |
| External Network→ Organisational Capability | 0.209 | p<0.01 |
| External Relationships/Networks→ Marketing Capability | 0.272 | p<0.01 |
| Innovation Capability → Product Innovation Strategy | 0.344 | p<0.01 |
| Innovation Capability →Market Expansion Strategy | 0.348 | p<0.001 |
| Marketing Capability → Product Innovation Strategy | 0.123 | p<0.001 |
| Human Capability →Product Innovation strategy | 0.395 | p<0.001 |
| Human Capability →Market Expansion Strategy | 0.237 | p<0.01 |
| Product Innovation Strategy →Performance | 0.459 | p<0.001 |
| Expansion Strategy →Performance | 0.051 | not significant |
| Remaining-in-private-ownership →Performance | 0.283 | p<0.05 |
| External Effect →Performance | -0.257 | p<0.001 |
| Financial Barriers →Performance | -0.180 | p<0.05 |
| | | |
| **All other possible paths** | | |
| Government Policies → Marketing Capability | 0.128 | p<0.05 |
| Government Policies → Financial Capability | 0.164 | not significant |
| Government Policies → Organisational Capability | 0.097 | p<0.05 |
| Resources Dynamism→Innovation capability | 0.137 | p<0.05 |
| Resources Dynamism→Organisational Capability | 0.108 | p<0.01 |
| Human Resources→ Innovation capability | 0.016 | not significant |
| Human Resources→ Financial Capability | 0.121 | p<0.05 |

| | | |
|---|---|---|
| External relationships/networks→Innovation Capability | 0.125 | p<0.05 |
| External Network→ Financial Capability | 0.108 | not significant |
| External Relationships/Networks→Human Capability | 0.165 | p<0.05 |
| Marketing Capability →Market Expansion Strategy | 0.164 | p<0.05 |
| Financial Capability →Product Innovation Strategy | 0.207 | p<0.05 |
| Financial Capability → Expansion Strategy | 0.187 | not significant |
| Organisational Capability →Product Innovation Strategy | 0.038 | not significant |
| Organisation Capability →Market Expansion Strategy | -0.166 | not significant |
| $\mathbf{R}^2$ | 0.450 | |

**Figure 4.1 Structural Model Results for New Zealand Samples**



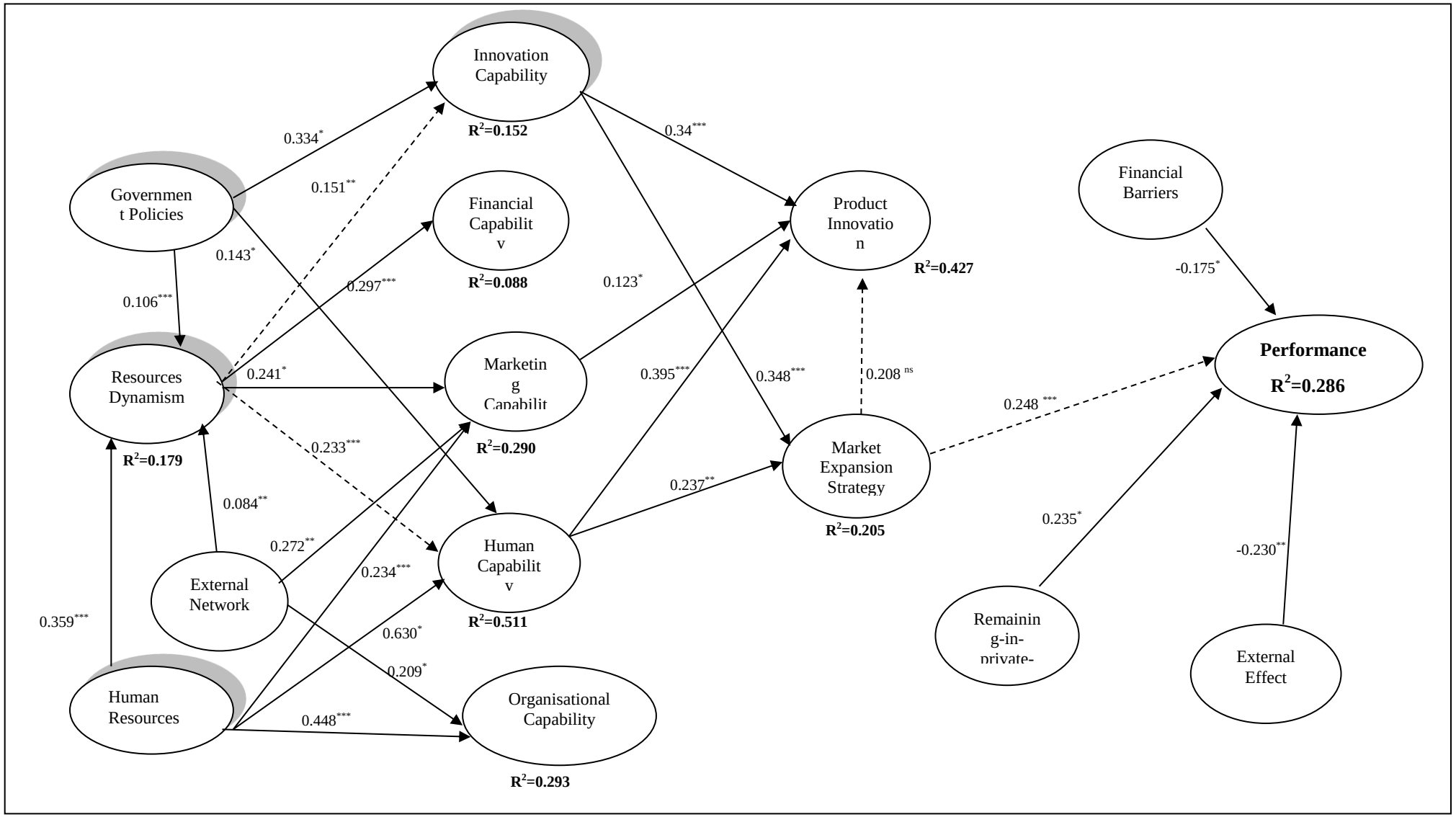

*Note:*p<0.05; **p<0.01; ***p<0.001, ns=not significant*

### *5.9.3 Mediating Analysis*

Path analysis could also help to identify the mediators in the structural model. Mediation is a third variable effect that informs the relation between two variables by explaining how or why the two variables are related (Fairchild, MacKinnon, Taborga & Taylor 2009). From the baseline model shown in Figure 5.1, government policies were found to have significant relationships to innovation capability and resources dynamism. According to the analysis of all other possible paths in Table 5-14, resources dynamism was found to have a significant relationship to innovation capability ($\beta$=0.151; $p<0.01$). A new structural model showing the additional relationship was developed from the PLS-graph and is presented in Figure 5.2. It was found that the path coefficients between government policies and innovation capability had slightly reduced (from $\beta$=0.362 to $\beta$=0.334). However, the path was still statistically significant. Therefore, the resources dynamism variable could be considered as a partial mediator. It has partially mediated the impact of government policies on innovation capability. A similar scenario was found in the relationship between resources dynamism and human capability. It was found that the path coefficient for Human Resources→Human Capability slightly reduced from $\beta$=0.630 to $\beta$=0.542 when resources dynamism was present. The path was still significant after the mediating effect. This could imply that resources dynamism partially mediates the impact of human resources to human capability. In other words, the existence of resources dynamism could explain the relationship between government policies and innovation capability, human resources and human capability.

In addition to the partial mediators a full mediator was found in this structural model. Comparing Figure 5.1 and Figure 5.2, a significant path was found between market expansion strategy and performance when the path Product Innovation Strategy → Performance was not included in the path analysis (Figure 5.2). There was also a significant path between market expansion strategy and product innovation strategy ($p<0.005$). The $R^2$ value of the model was reduced to 0.286 without the product innovation effect. However, when product innovation strategy was included in the path analysis (Figure 5.1), the effect between market expansion strategy and performance became insignificant, while increasing the $R^2$ to 0.450. In addition, the path coefficients dropped from $\beta$=0.248 to $\beta$=0.057. In this case, product innovation strategy has fully mediated the impact of market expansion strategy. This might imply that the impact of market expansion strategy on performance would be strongly influenced by product innovation strategy. This observation is important in helping technology-based firms decide whether or not to pursue product innovation strategy or market expansion strategy while facing constraints in resources. The mediating analysis reveals key insights into resources and strategies that should be emphasised.

**Figure 5.2 Structural Model Results for New Zealand Sample (Mediating Analysis)**




*Note:*p<0.05; **p<0.01; ***p<0.001, ns=not significant*

### *5.9.4 Differences between High-Growth and Non-High-Growth Firms*

There were 110 responses received from New Zealand technology-based firms and these responses could be divided into two groups based on their growth performance. The first group were high-growth firms that had satisfied the OECD definition by having at least 20% sales growth for three consecutive years and at least 10 employees at the start of the observation period. The second group were non-high growth firms that did not meet the OECD definition. In this study, 50 responses were in the high-growth group and 60 were non-high-growth firms. According to Chin (2000), the minimum sample requirement in PLS-path modelling would be times i) the greatest number of formative indicators in a construct, or ii) the greatest number of structural paths going into a construct, whichever is higher. From the baseline model shown in Figure 1, the performance construct has the greatest number of structural paths (five). Therefore, the minimum sample requirement based on the model would be 50. The number of responses received from high growth and non-high growth firms was sufficient for PLS-path modelling.

Figure 5.3 and 5.4 present the structural model. The paths significance for both groups was quite similar except for two paths, Marketing Capability →Product Innovation Strategy and External Relationships/Networks→Organisational Capability. These two paths were found to be insignificant in the high-growth model but significant in the non-high-growth model. These models are similar to the earlier structural model in Section 5.9.2. However, it appears that the model was better explained in the high-growth group where the $R^2$ value was 0.673, whereas it was only 0.283 in the non-high-growth group. $R^2$ values represent the predictive power of the structural model. A vast difference in the $R^2$ values for the two groups of firms implies that the structural model developed has a higher predictive power for the high-growth group than for the non-high-growth group. This is reasonable as the model was based on interviews with high-growing technology-based firms in New Zealand and Malaysia. It is not surprising therefore that the structural model has a greater ability to explain high-growth firms. Table 5-18 compares the two figures and reveals a few differences in the path coefficients and relationships. First, government policies related negatively with resources dynamism in the high-growth group. Nevertheless government policies still had a strong positive influence on innovation capability in both groups. Secondly, a negative relationship was found between resources dynamism and marketing capability

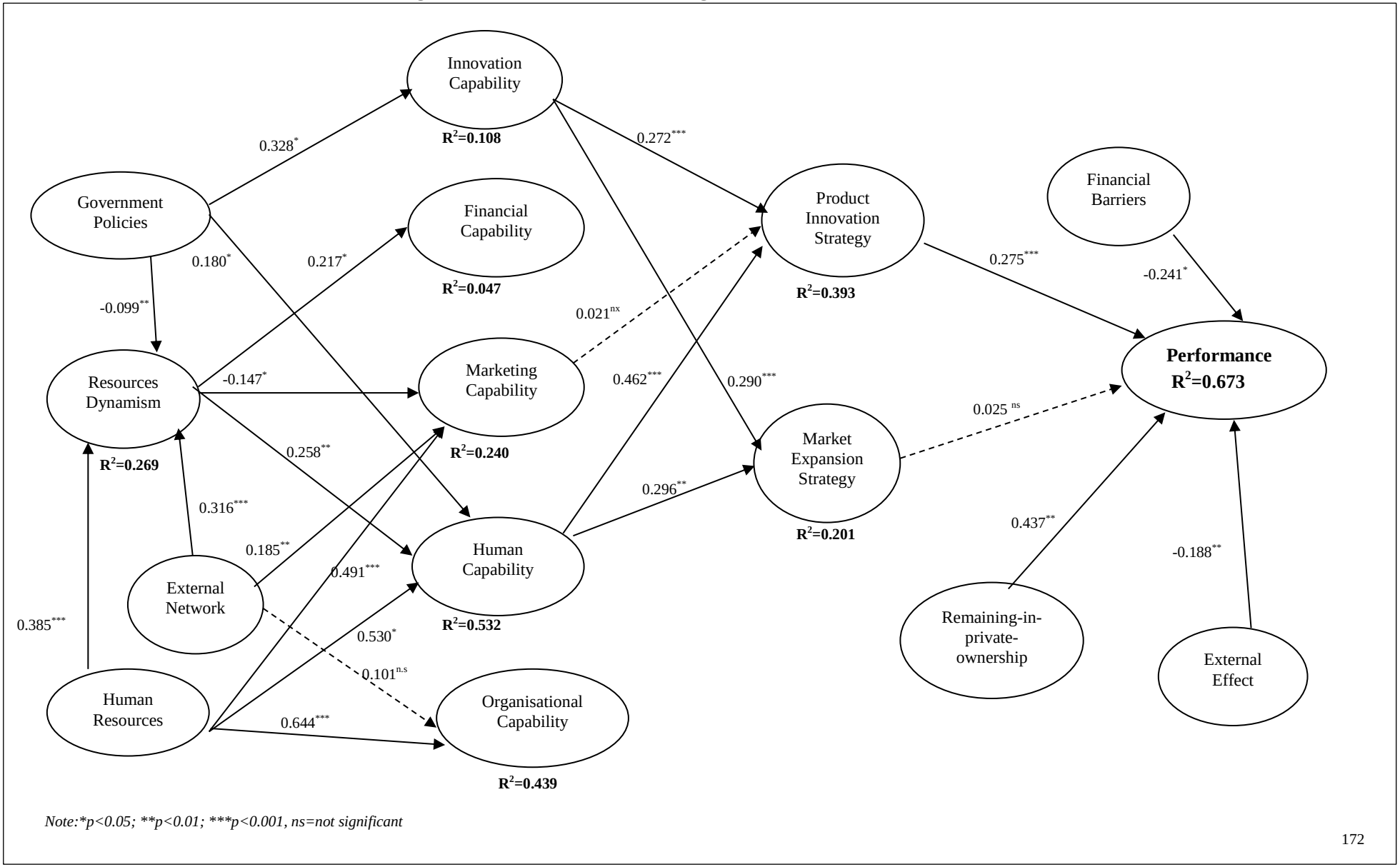
in the high-growth group. Another interesting finding was that all the path coefficients leading towards performance, with the exception of Product Innovation Strategy→Performance had reduced in the low-growth model.

Based on these observations it appears that the growth experiences of high-growth and non-high-growth firms could be different. Their growth paths were quite similar in terms of path significance but in the high-growth firms the challenges factors such as external effects and financial barriers had higher path coefficients in relation to performance. This might indicate that technology-based firms have similar resources and capabilities that influence their growth paths. However, the ability to become either a high-growth or a low-growth firm depends on how they overcome challenges such as external effects and financial barriers.

**Table 5-18 Comparisons between High-Growth and Non-High-Growth Structural Models**

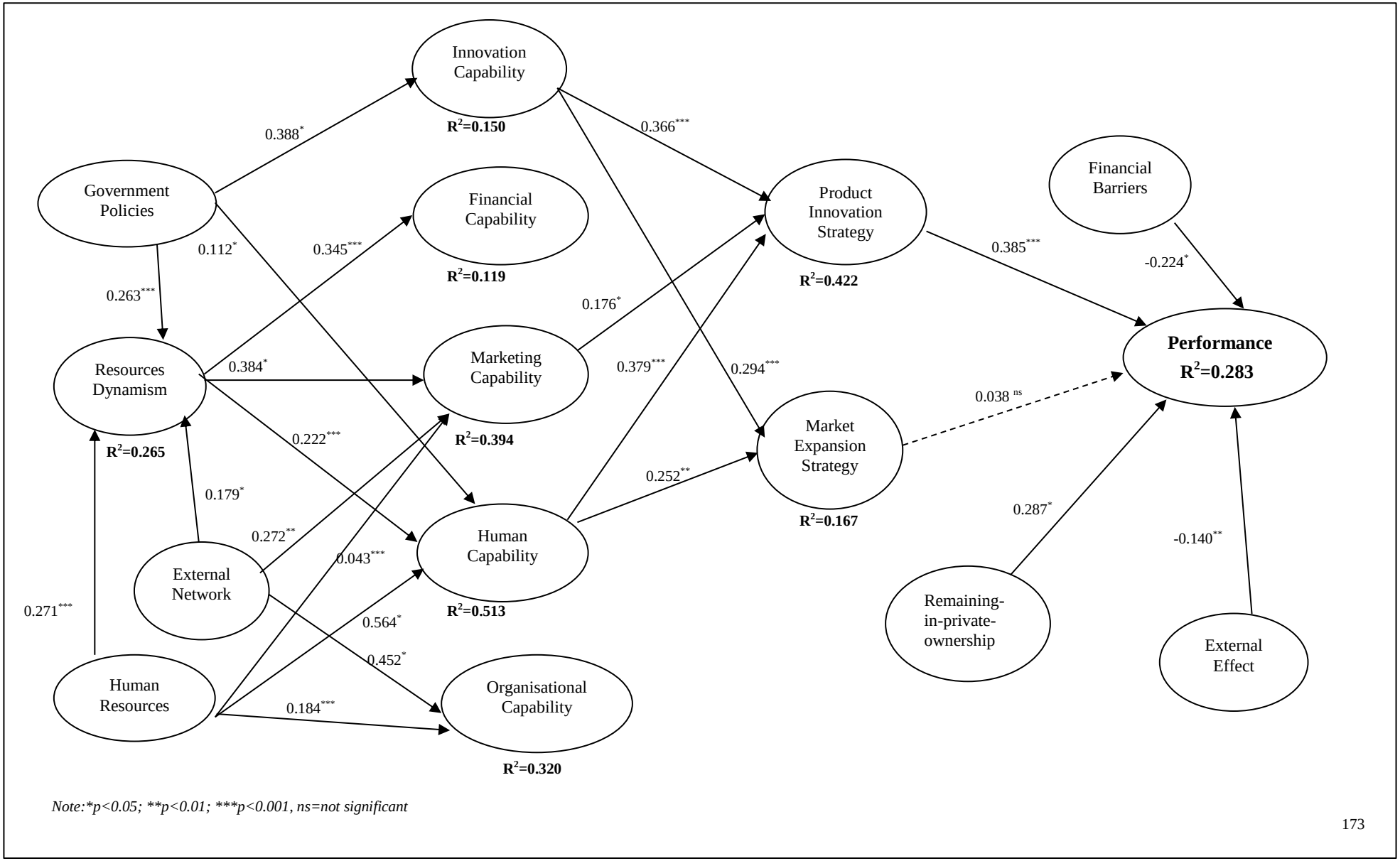
| ***Structural Path*** | ***Path coefficients High Growth*** | ***Sig*** | ***Path coefficients Non-high Growth*** | ***Sig*** |
|---|---|---|---|---|
| **Based on Regression Analysis** | | | | |
| Government Policies →Resources Dynamism | -0.099 | p<0.01 | 0.263 | p<0.01 |
| Human Resources → Resources Dynamism | 0.385 | p>0.001 | 0.271 | p<0.01 |
| Government Policies → Innovation capability | 0.328 | p<0.05 | 0.388 | p<0.05 |
| Government Policies →Human Capability | 0.182 | p<0.05 | 0.112 | p<0.05 |
| Resources Dynamism → Marketing Capability | -0.147 | p<0.05 | 0.384 | p<0.05 |
| Resources Dynamism → Financial Capability | 0.217 | p<0.05 | 0.345 | p<0.05 |
| Resources Dynamism → Human Capability | 0.258 | p<0.001 | 0.222 | p<0.01 |
| Human Resources → Human Capability | 0.530 | p<0.05 | 0.564 | p<0.05 |
| Human Resources → Organisational Capability | 0.644 | p<0.001 | 0.184 | p<0.001 |
| Human Resources →Marketing Capability | 0.491 | p<0.001 | 0.043 | p<0.001 |
| External Relationships/Networks→Resources Dynamism | 0.316 | p<0.05 | 0.179 | p<0.05 |
| External Network→Marketing Capability | 0.385 | p<0.001 | 0.271 | p<0.001 |
| External Relationships/Networks→Organisational Capability | 0.101 | n.s | 0.452 | p<0.01 |
| Innovation capability → Product Innovation Strategy | 0.272 | p<0.001 | 0.385 | p<0.001 |
| Innovation Capability →Expansion Strategy | 0.290 | p<0.001 | 0.294 | p<0.001 |
| Marketing Capability → Product Innovation strategy | 0.021 | n.s. | 0.176 | p<0.05 |
| Human Capability →Product Innovation strategy | 0.462 | p<0.001 | 0.379 | p<0.001 |
| Human Capability →Expansion Strategy | 0.296 | p<0.05 | 0.252 | p<0.001 |
| Product Innovation Strategy →Performance | 0.275 | p<0.01 | 0.385 | p<0.001 |
| Expansion Strategy →Performance | 0.025 | n.s. | 0.038 | n.s |
| Remaining-in-private-ownership →Performance | 0.437 | p<0.01 | 0.287 | p<0.01 |
| External Effect →Performance | -0.188 | p<0.01 | -0.140 | p<0.01 |
| Financial Barriers →Performance | -0.241 | p<0.01 | -0.224 | p<0.01 |
| $\mathbf{R^2}$ | **0.673** | | **0.283** | |

**Figure 5.3 Structural Model of High-Growth Firms in New Zealand**




*Note:*p<0.05; **p<0.01; ***p<0.001, ns=not significant*

**Figure 5.4 Structural Model of Non-High-Growth Firms in New Zealand**




*Note:*p<0.05; **p<0.01; ***p<0.001, ns=not significant*

### *5.9.5 Goodness of Fit*

Many studies of structural paths or structural equation modelling place emphasis on how well the model fits a set of observations. However, the measurement of how well it fits relates to the ability of the model to account for sample covariances, and assumes all measures are reflective (Chin 1998). Though Tenenhaus, Amato & Esposito (2004) have suggested a global criterion for measuring the suitability of PLS structural equation modelling, it is still best applied to models with reflective indicators. According to Chin (2010), the goodness of fit index proposed could result a natural trade-off when formative indicators are used. This is because the predictive ability of the inner model is increased at the expense of the outer model. As this study uses both reflective and formative indicators, the goodness of fit index is not relevant. Furthermore, the model has been examined on its measurement and structural criteria. The majority of item loadings were well above 0.6, indicating that each item accounted for 50% or more of the variance of the underlying latent construct. In addition, most of the standardised paths were above 0.20 and generated a reasonable $R^2$ value of 0.450 (see Figure 5.1). Therefore this model has proven its predictive capability based on the current set of samples.

## 5.10 Summary

The purpose of this chapter is to analyse and discuss the quantitative study results. It also assesses the hypotheses developed from the qualitative study discussed in Chapter 4. Multiple regression analyses were used to evaluate the hypotheses. Based on the regression results, the chapter also explains the hypothesised model from path analysis perspective by using the PLS-graph. The findings from this chapter are summarised below:

Generally, the responses from New Zealand and Malaysia were quite different in several characteristics: the academic qualifications of founders, team founding, board positions held by owner(s), age and number of employees, degree of government assistance, external networking and degree of growth. Because of these differences, the hypotheses were tested for each country.

Hypothesis 1a was supported in New Zealand but not in Malaysia. It was found that government policies have a significant influence on a New Zealand firm's ability to use resources dynamically. Conversely, Hypothesis 1b was supported in both countries. Human resources were found to have a significant influence on a firm's ability to use resources dynamically in both New Zealand and Malaysia. On the other hand, Hypothesis 1c was not supported in both countries. External relationships/networks had no influence on technology-based firms' ability to use resources dynamically.

Hypothesis 2 has four sub-hypotheses to test the effects of government policies, resources dynamism and human resources on five internal capabilities. Hypothesis 2a was only partially supported, as government resources had a significant influence only on innovation capability in both countries but had no significant relationship with the other four capabilities. Hypothesis 2b was also partially supported as human resources were found to be significantly related to human capability in both countries but to organisational capability only in New Zealand. It had no significant relationship to innovation capability, marketing capability and financial capability in both countries, as well as organisational capability in Malaysia. Similarly, Hypothesis 2c was supported by the effect of resources dynamism on financial capability in both countries, but on human capability and marketing capability in New Zealand only. It had no significant relationship to the other capability. Finally, Hypothesis 2d was also partially supported as external relationships/networks were found to be significantly related to marketing capability and organisational capability in New Zealand. It had no significant relationship with Malaysian firms' capabilities.

The relationships between capabilities and strategies were investigated with several hypotheses. Hypothesis 3a examined the relationship between capability and product innovation strategy. The hypothesis was partially supported in both countries. Product innovation strategy was significantly influenced by innovation capability, human capability and marketing capability in New Zealand, but only by organisational capability in Malaysia. Hypothesis 5 was also partially supported. Market expansion strategy was found to have significant relationship to innovation capability and human capability in New Zealand but only to innovation capability in Malaysia. Organisational capability, marketing capability and financial capability had no effect on market expansion strategies in either country. Hypothesis 7a was not supported in both

countries as no capability had significant positive relationship with remaining-in-private-ownership strategy. Hypothesis 9a was partially supported in both countries. Human capability was found to have significant relationship with strategy flexibility strategy in New Zealand and Malaysia; and financial capability had an influence in Malaysia samples. The other capability had no significant relationship with strategy flexibility strategy.

Hypotheses 4, 6, 8a, 9b, 10 to 12 were concerned with relationships involving strategies, growth barriers, external environment effects and performance. Hypotheses 4a, 10b and 12 were supported in the New Zealand context. Product innovation strategy, external environment effects and financial barriers had significant influence on the performance of technology-based firms in New Zealand. Hypotheses 6, 9b and 11 were not supported in New Zealand, where the relationships between performance and market expansion or human resources barriers were not significant. Remaining-in-private-ownership was found to have significant relationship with performance of New Zealand firms but the relationship was contradicted to what was hypothesised. It was found that remaining-in-private-ownership has significant positive relationship with performance, thus Hypothesis 8a was not supported. None of these hypotheses were supported in the Malaysian context. In other words, there was no significant relationship between the factors in the hypotheses and the performance of technology-based firms in Malaysia. These results could be caused by the small sample size in the Malaysian study.

In addition to hypothesis testing, path analysis based on the regressions results in New Zealand was conducted on the hypothesised model. The path analysis confirmed the relationship found in the regression tests. By looking at individual effects it also identified several structural paths that were significant. Mediating analysis was conducted to examine the mediation effect on the variables. It was found that product innovation strategy was a full mediator for market expansion strategy in relation to performance. The inclusion of product innovation strategy changed the relationship between market expansion strategy and performance from significant to non-significant. The path analysis also showed the results of analysis based on high-growth and non-high-growth technology-based firms in New Zealand. Although there was little difference in path significance, it was found that the structural model had higher

predictive power in high-growth firms. Further examinations based on similar analytical approaches and procedures were conducted on all responses from Malaysia and New Zealand, as well as on the aggregated findings from high-growth and non-high-growth firms. The results are outlined in Appendix I and the major results are consistent with discussions in this chapter.

The next chapter will discuss the implications and key contributions of the research by integrating the findings from both qualitative and quantitative analyses.

# CHAPTER 6 DISCUSSION AND IMPLICATIONS OF THE STUDY

## 6.1 Overview

This chapter discusses the results from the interviews and surveys conducted in Malaysia and New Zealand. It aims to provide an integrative discussion based on the two data collection methods. It reviews the purpose of the study and shows how the research questions are connected then uses the findings from the study to answer those questions. The chapter concludes with the contributions the study makes and the implications of its findings.

## 6.2 Summary of Research Purpose

A number of business growth studies have been carried out to explain why firms grow (Dobbs & Hamilton 2007; Baum et al. 2001; Coad & Tamvada 2011). Growth factors include entrepreneur characteristics (McPherson 1996; Zhang et al. 2008), characteristics of firms (Dunne & Hughes 1994; Bellak 2004), strategies (Dess 1987; Ortega 2010), environment (Galbreath & Galvin 2008; Chandler & Hanks 1994b) and resources (Wernerfelt 1984; Gruber et al. 2010). Storey (1994) indicates that firms grow when several growth factors are combined and exploited. Most of the studies link one or two growth factors and look at their concurrent effect. However, growth is a phenomenon that occurs over a short period of time, especially when it involves high growth in a dynamic environment. Such high growth does not occur simply because of one or two factors that happen to have an impact on growth. These factors should not diminish over a short time period if the firm stops growing (Storey 2011). Pettus (2001) also comments that the growth of a firm can be understood as a sequential process based on the exploitation and development of resources. Thus it is worth investigating the high-growth experiences of firms competing in a very volatile industry. Furthermore, most of the research into business growth has been conducted in European countries and in North America. There is a lack of literature examining the high-growth phenomenon in the Asia Pacific. To address this deficiency, the current study sought to understand how technology-based firms achieve high-growth performance in two countries in this region.

As noted earlier, several significant factors need to work together to create high-growth performance. Based on the theories discussed in Chapter 2 and the case study analysis on high-growth experiences presented in Chapter 4, a conceptual model that relates to resource-based views and competitive strategies was developed. Analysis also discovered the specific influences of volatile environments and internal capabilities on technology-based firms. This model recognises the importance of combining several growth factors as well as providing path analysis on the process of growth. The multi-dependence relationships hypothesised in the model are designed to validate the impact of each factor on performance in technology-based firms. Subsequently, this study proposes a performance model based on path analysis and shows the variances in different growth categories.

## 6.3 Discussion of Research Questions and Growth Model

The findings from case studies and surveys are described in relation to the underlying research questions. The results are then compared with previous research.

### *6.3.1 Research Question 1: What are the key characteristics of high-growth technology-based firms in these countries?*

This research question is answered by using the findings drawn from the case studies in Malaysia and New Zealand. From the interviews with award-winning high-growth technology-based firms in both countries, the resource-capabilities owned by these firms were found to be similar, as were the competitive strategies used to achieve above-average growth rates. Analysis of the case studies could not differentiate sustained high-growers and non-sustained high growers on the basis of the dimensions examined. This could imply that other unconventional factors such as optimism and chance theory, as proposed by Storey (2011), have caused some high growers to fail to maintain their high-growth positions. In addition, there is only a one to three year difference in the high-growth period experiences of sustained and non-sustained growers, and this may have little differentiation effect on the groups. However, four dimensions were identified to explain the high-growth performances of both groups. The dimensions were: external and internal resources, capabilities, opportunity-driven strategies and growth challenges. A conceptual framework was developed for further validation. The framework (Figure 4.1) suggested the high-growth experiences could

be explained by a path model connecting the four elements rather than combining all the factors concurrently. It is hypothesised that a firm's performance is determined by its path-dependent decisions about resources-capabilities, strategies and overcoming challenges.

***Resources***

The firms interviewed received supportive assistance from both internal and external stakeholders. Government and external relationships/networks offered important resources for growth. They offered not only finance and advice but also technical support in ways that helped the firms to use their resources dynamically. Although the governments of New Zealand and Malaysia had different policy approaches, both helped the high-growth firms to develop innovation capability. The New Zealand government has a highly selective approach in providing grants to technology-based firms with growth potential, while the Malaysian government offers 'one size fits all' tax incentives to all technology-based firms that qualify. The effects of these government policies were similar to those studied by Herrera & Sanchez-Gonzalez (2012) and Czarnitzki (2006) who found that public funding led to increased research and development activity in private firms. Government grants, subsidies, infrastructures in the Technology Park, assistance and advice become part of the resources firms use to achieve high growth. Although previous studies (Mole, Hart, Roper & Saal 2008; Lambrecht & Pirnay 2005) fail to identify the relationship between government assistance and organisational performance, these findings indicate that governments have a significant impact on high-growth technology-based firms. This study supports Greene (2012) who evaluated the public assistance offered in various parts of the world and recommended that New Zealand channel its assistance to small high-growth businesses. Prior to this, Mason & Brown (2010, 2011) also noted the importance of good government support policies for high-growth firms.

The high-growth technology-based firms interviewed in this study managed multiple external relationships with their suppliers, customers, venture capital firms, technology and overseas partners. The firms used their network partners to expand into new markets or territories, combine resources for new innovation, seek financial or managerial advice, gain industry information and experiences. The many studies of external relationships/networks prove their importance to internationalisation (Chetty &

Holm 2000), innovation (Gronum et al. 2012), resource and capabilities acquisition (Zhang et al. 2011; Mahmood et al. 2011) and business performance (Lee et al. 2001). Examples from the interviews in this study can be found in Chapter 4 and are consistent with the findings of previous studies as to how firms utilise their external relationships/networks. Supportive external environments, and in particular support from government and external relationships/networks, contribute sufficient resources for growth and also develop the capabilities of technology-based firms.

During the interviews, human resources were the most frequently-mentioned resources at business level. Technology-based firms rely heavily on their intellectual assets and creative ideas to differentiate themselves in the competitive marketplace. It is not surprising therefore that most firms emphasised the importance of getting the best talent to deliver above-average growth performance. Researchers such as Huselid, Jackson & Schuler (1997) and Yeung & Berman (1997) link human resources practices to business capability as well as performance. Another finding from the interviews is the way in which internal and external resources are manipulated, acquired, shared and extended to develop capabilities for growth. According to Chandler & Hanks (1994a), it is difficult from a measurement perspective to divorce the concept of resource availability from the capability to utilise those resources. For this reason the study uses the concept of resources dynamism to explain the coordination of sets of resources from government, external networks or human resources. This resources dynamism concept is similar to that of dynamic capabilities, but the latter emphasises capabilities that are not easily transferable yet enable the firm to innovate outside everyday parameters. In this study, resources dynamism refers only to the extent that external and internal resources are shared and/or acquired to develop new capabilities according to the firm's needs.

***Capabilities***

Penrose (1959) theorised that the growth of a firm could be explained by the way in which it generated and deployed its resources. However, a firm may not be able to achieve above-average performance unless it is able to turn those resources to advantage. Capability is defined as the ability to transform input into output (Lado & Wilson 1994) as well as filling the gap between intention and outcome (Dosi, Nelson & Winter 2000). Based on the interviews with CEOs/top managers of high-growing firms,

five distinct capabilities were discovered. First of all, it was found that some firms had successfully invested their resources in research activities such as new product development and intellectual property ownership. The relationship between innovation or technological capability and performance was suggested by Ravichandran & Lertwongsatien (2005); Lee et al. (2001); Ortega (2010) and Gracia-Manjon & Romero-Merino (2012). Human capability was also prominent in the firms interviewed. Stringent selection procedures for employees, continuous up-skilling initiatives and effective performance management were frequently mentioned by interviewees. Previous studies conducted by Barringer et al. (1998); Florin et al. (2003) and Hsu & Wang (2012) describe the importance of human capital to growth performance.

Organisational capability was also evidenced during the interviews in terms of the efficient and effective application of four management functions: planning, organising, leading and controlling. Organisational capability is the main source of a firm's performance (Knight & Cavusgil 2004; Grant 1991). Top management teams played an essential role in cultivating the growth and innovation-oriented cultures that led to high-growth performance. Because of resource constraints they were very careful in their allocation and distribution of resources. However the same firms were apparently very aggressive in their marketing efforts. Though they seldom organised marketing campaigns, they were constantly looking for new market expansion opportunities and always strive to provide customer-driven services. Gruber et al. (2010) and McCalister (2012) also link these marketing capabilities to growth performance. Finally the case studies provided evidence of the way financial capability influences the survival and growth of business. Strong financial resources are required for continuous product/service development and market expansion; hence the ability to manage financial resources and ensure profitability as well as growth is crucial to this group. Florin et al. (2003) and Lee et al. (2001) have examined the relationship between financial capability and growth performance in a different context.

***Strategies***

Findings from the case studies reveal that differentiation strategy based on product innovation and niche focus are important determinants of business growth. Huge efforts have gone into new product development and product improvement. Some of the firms offer products or services to fill specific niche markets. This is consistent with the

finding of Santos-Vijande et al. (2011) and Ortega (2010) that differentiation strategy has a direct, positive influence on business performance. Coad & Rao (2007) and Freel & Robson (2004) confirm the impact of product innovation in high-tech and manufacturing sectors respectively. Zahra (1993) also provides empirical support for the perception that firms in dynamic or growth environments emphasise new business creation and innovation. Porter (1985), Mosakowski (1993) and Echols & Tsai (2005) also establish the relationship between niche-market focus and business performance.

The majority of firms interviewed were involved in overseas ventures to generate higher business volumes. Two of the firms from New Zealand were born-global firms and sold only to overseas customers. This emphasis on internationalisation to grow business performance is consistent with studies conducted by Zahra, Ireland & Hitt (2000), Chetty & Campbell-Hunt (2004) and Keen & Estemad (2011). However the attention to overseas markets does not impede the interviewees' intentions to grow domestically. The findings therefore imply another critical growth strategy – market expansion. Expanding to new segments of the market allows firms to spread the development cost of new innovations as well as increase economies of scale. Market expansion was suggested as a significant strategy in the information-technology industry (Agrwal, Pandit & Menon 2012), in service firms (Carmen & Langeard 1980) and in small medium enterprises (Reijonen et al. 2012), where these categories were seen as similar to the scope of case studies.

It was found that some firms, especially in Malaysia, opted for public ownership in order to generate more funding for growth. Two firms in New Zealand were acquired by overseas companies so they would have more resources for growth and enjoy synergy through the internationalisation process. When faced with financial constraints they were willing to let go of private ownership in order to have greater growth opportunities (Poulsen & Stegemoller 2009). Florin et al. (2003) also justify the perception that going public gives a firm a bigger resource base to improve business performance. Finally, Leitner & Guildenberg (2010) reveal that firms following a combination of strategies outperform firms that use only differentiation strategy. The high-growth firms in this study used a combination of strategies, some concurrently. As noted in Chapter 4, these firms allowed flexibility in their strategies. This was crucial

as they were competing in a dynamic environment with frequent advances in technology and customer requirements.

***Growth Challenges***

Four growth challenges were identified from the interviews: external environment effects, industry competition, financial and human capital barriers. Garnsey & Heffernan (2005a) note that substantial growth is rare and continuous growth unusual. They also note that growth interruptions result from both internal and external dynamics. Therefore it is vital to examine the growth challenges faced by firms as well as their resources and capabilities and the strategies involved in the growing process. Previous studies survey the impacts of external environment on performance from entrepreneurial (Lumpkin & Dess 2001 and Zahra 1993), founder competence (Chandler & Hanks 1994b), strategy (Covin et al. 2000) and industry competition (Porter 1985 and Galbreath & Galvin 2008) perspectives. It is therefore not surprising that the high-growth firms in this study were greatly challenged by their external environments and acknowledged the impact on business performance.

Several studies mention that growth rates do not seem to increase with profits (Davidsson et al. 2009; Coad & Holzl 2012). The high-growing firms in this study commented on the difficulty of funding business growth. Continuous innovation and expansion activities easily exhausted their financial resources, but stopping these activities made it tougher to compete in the marketplace. Getting sufficient investment in their businesses was very difficult and some eventually opted for public funding or acquisition by bigger firms. Finding appropriate and committed talent also challenged their ability to grow. Human resources barriers slowed growth for some firms, especially when expanding to new markets. The lack of technical, marketing and managerial expertise negatively impacted their expansion plans.

Based on this discussion, it is clear that technology-based firms do not grow on the spur of the moment or because of one particular factor. These firms went through a series of efforts and processes that required continuous management of resources, capabilities, strategies and challenges. It would be difficult to link just one of these elements to performance without considering the overall impact of all of them. For this reason the study developed a number of hypotheses to examine the influence of various elements

on growth performance. These hypotheses were tested with a series of quantitative analyses using Study 2 survey data to help answer the study's research questions.

### *6.3.2 Research Question 2: How do high-growth firms differ from non-high-growth firms?*

Study 2 examined the responses from technology-based firms in the two countries. This study was based on the conceptual model developed from award-winning high-growth firms in the same industry, and was set up to test whether the model was applicable to high-growth firms only or technology-based firms in general. It was also used to find the differences between high-growth firms and non-high-growth firms. In spite of extensive efforts to generate responses from both countries, the survey had a very low response rate especially in Malaysia, which returned only 53 useable questionnaires. As a result it is not possible to provide valid comparisons for technology-based firms in the Malaysian context. For this reason path analysis based on Partial Least Square (PLS) approach was used on the conceptual model to compare high-growth and non-high-growth firms in New Zealand only. Other aspects of the path analysis of the model are examined and discussed in Section 6.3.4.

Many studies have tried to differentiate high-growth and low-growth firms (Siegel et al. 1993; Delmar et al. 2003; Smallbone et al. 1995; Almus 2002). Most use dimensions such as founder characteristics, organisational factors, industry structure, business practices and strategies. The path analysis used in this study, based on high-growth and non-high-growth firms in New Zealand, reveals the importance of interaction between resources, capabilities, strategies and challenges on growth performance. A higher $R^2$ value in the high-growth model implies that the interactions between those elements are stronger for this group of firms. Previous studies recognise only the individual effect on performance of resources and capabilities (Penrose 1959; Krogh and Cusumano 2001; Carmeli & Tishler 2004; Gruber et al. 2010), strategies (Fesser & Willard 1990; Smallbone et al. 1995; Kim & Mauborgne 1997; Weinzimmer 2000; Gundry & Welsch 2001; Andersson 2003; Litunnen & Virtanen 2009), or challenges (Scott & Bruce 1987; Keogh & Evans 1999; Carpenter & Petersen 2002). This study shows that different interactions between these elements result in different growth performance. Furthermore, high-growth firms have greater growth ambitions than non-high-growth

firms. This is consistent with the findings of Barringer et al. (2005) and Baum et al. (2001).

Comparing Figure 5.3 and 5.4 in Chapter 5, it appears that firms in both categories experience similar growth processes. However there are major differences in path relationships. First, all the path coefficients leading towards performance were reduced in the low-growth model except Product Innovation Strategy→Performance. This implies that strategy has a greater impact on the performance of non-high-growers. On the other hand, high-growth firms had higher path coefficients in challenges factors such as external effects and financial barriers in relation to performance. In other words, the negative coefficients had greater impact on high-growth firms. This indicates that the success of high-growth firms can be strongly affected by growth constraints or challenges that hinder their growth performance. The findings indicate that all the technology-based firms in the study had similar resources and capabilities that influenced their growth paths, however their ability to become high-growth or non-high-growth firms depended on how they overcame obstacles such as external effects and financial barriers. The research could not sufficiently support the resources-based view, which proposes that a firm's growth is strongly influenced by the resources it owns. The comparison also reveals that the growth challenges dimension is far more important than the others in determining the growth performance of technology-based firms. These challenges are internal barriers and external threats. Their importance is not surprising because technology-based firms are often exposed to external environment change and internal constraints when pursuing growth.

From this discussion it is obvious that there are differences between high-growth and non-high growth firms in the technology industry. Although they operate in a similar environment their growth processes and experiences can be different. The lower $R^2$ value in the same model for non-high-growth firms suggests that the conceptual model is better applied to high-growth firms. The interaction effects between the dimensions were stronger for high-growth firms. It may be inferred that high-growth firms make more purposeful choices about using their resources, mastering important capabilities, directing growth strategies and managing challenges from internal and external environments. In other words, the actions and decisions made by high-growth firms are different from those of non-high-growth firms, which results in diverse performance. In

addition, growth challenges have greater influence on high-growth firms while strategy is the greatest determinant for non-high growth firms. This suggests that the growth performance of technology-based firms is heavily dependent on their ability to manage challenges from both internal and external environments.

### *6.3.3 Research Question 3: What are the influences of resource-capabilities, strategies and growth challenges from the internal and external environment on performance?*

From the literature review and the findings from Study 1, several factors are seen to influence a firm's growth performance. The interaction between factors is shown in the growth experiences hypothesised in the conceptual model. It is important to examine the impact of these factors on each other as well as on growth performance. The discussion for this research question is divided into two parts.

#### 6.3.3.1 To what extent do resource-capabilities affect the strategies of technology-based firms?

Previous studies (Penrose 1959; Chandler & Hanks 1994a; Bruton & Rubanik 2002) emphasise the importance of resources to a firm's growth. Resources are often divided into tangible and intangible categories (Gruber et al. 2010), that are gathered from internal management and external stakeholders. This study reveals three important sources of growth resources: government support policies, external relationships/networks and human resources. By using these resources efficiently a firm can transform them into capabilities. It also appears that a firm's ability to use the resources dynamically can influence its internal capabilities. The quantitative analysis led to several observations on resource-driven capabilities.

First, it was found from the regression analysis that government policies had a significant relationship to innovation capability in both countries. This innovation capability had a significant relationship to product innovation strategy ($\beta=0.38$, $p<0.001$) implemented by the firms in New Zealand, and to market expansion strategy ($\beta=0.38$, $p<0.001$ in New Zealand; $\beta=0.35$, $p<0.05$ in Malaysia) implemented in both countries. It is also important to note that product innovation strategy had a significant relationship to performance ($\beta=0.46$, $p<0.001$), where hypothesis H4a is strongly supported in New Zealand. Studies conducted by Mole et al. (2008) and Lambrecht &

Pirnay (2005) failed to confirm the link between government policies and organisational performance, but this study proves the relationship in the New Zealand context. Furthermore, the results are consistent with previous studies on innovation capability and business growth (Ravichandran & Lertwongsatien 2005; Lee et al. 2001; Ortega 2010 and Gracia-Manjon & Romero-Merino 2012). Study 1 found different government approaches in each country to assisting technology-based firms. New Zealand's selective approach in offering financial assistance to technology-based firms appears to be more successful.

The findings also suggest that human resources are important in building the human capability, marketing capability and organisational capability of technology-based firms. Human capability had a significant relationship to the market expansion strategy, product innovation strategy and strategy flexibility implemented by the firms in the study. This is similar to the findings of Barringer et al. (1998); Florin et al. (2003) and Mason & Brown (2012) who relate human capital to growth performance. It also supports the notion of Edelman et al. (2005) that human capability has a significant relationship to innovation strategy. However, the relationship between human capital and market expansion strategy is different from that found by Barbero et al. (2011). Their study justifies the premise that marketing and financial capabilities have significant effects on market expansion strategy, but this study provides a contradictory result. The quantitative analysis carried out here shows that market expansion strategy is influenced by both innovation capability and human capability. This alternative view could be due to the different research context. Barbero et al. (2011) investigated a group of small and medium-sized high-growth enterprises while this study sampled technology-based firms. It also reveals the full mediation of product innovation strategy on market expansion strategy which in turn influences growth performance (Section 5.9.3). Hence market expansion strategy is influenced strongly by product innovation strategy in this group of firms, and product innovation strategy is heavily influenced by the way human capability and innovation capability relate to it. This study does however support Barbero et al. (2011) in finding that product innovation strategy has a significant relationship to marketing and human capabilities in the New Zealand context.

These results show that external relationships/networks influence the marketing and organisational capabilities of technology-based firms in New Zealand. Quantitative results from this study support the relationship between marketing capability and growth suggested by Gruber et al. (2010) and McCalister (2012) in the New Zealand context. It was found that marketing capability had significant impact on product innovation strategy ($\beta=0.21$, $p\leq0.05$). This strategy was found to influence growth performance ($\beta=0.46$, $p<0.001$). This implies that external relationships/networks influence a firm's innovation strategy as well as its growth performance. This is consistent with the findings of Gronum et al. (2012) and Lee et al. (2001). Nevertheless, it is surprising to find that marketing capability is influenced by external relationships/networks but does not significantly relate to market expansion strategy. Though Grant (1991), Cameli & Tisher (2004) and Knight & Cavusgil (2004) link organisational capability with performance, this study found it played only a limited role. Organisational capability influenced product innovation strategy only in Malaysia. The study could not confirm its impact on a firm's performance, therefore the role of external relationships/networks could not be discerned. Previous studies (Jones & Hill 1988; Freel & Robson 2004 and Lee et al. 2001) associate financial capability with growth performance but this quantitative study could not identify such a relationship. It was found in the Malaysian results that financial capability influenced a firms' ability to use its strategies flexibly but did not impact on performance. In New Zealand, however, resources dynamism did have a significant relationship to human capability and financial capability, but only human capability related significantly enough to product innovation strategy to influence organisational performance. This may imply that when product innovation is the chosen competitive strategy the firm's ability to renew its resources indirectly helps its performance.

The preceding discussion distinguishes different resources based on internal and external influences. It also examines their impacts on five capabilities that were found to affect the implementation of growth strategies. The study supports the argument proposed by Edelman et al. (2005), that neither resources nor strategies alone explain performance, but the 'fit' between resources and strategies is the important thing. The study enriches this argument by investigating the role of capabilities based on the study by Barbero et al. (2011). Dutta, Narasimhan & Rajiv (2005) define capability as the efficiency with which a firm employs a given set of resources (inputs) at its disposal to

achieve certain objectives (outputs). This study verifies the importance of alignment between resources, capabilities, strategies and performance. With reference to the resources-based capabilities and strategies theory suggested by Chandler & Hanks (1994a) and the performance model discussed in Section 5.9, this study confirms the importance of government policies, external relationships/networks, human resources and resources dynamism in providing sufficient resources to be transformed to innovation capability, marketing capability and human capability. With these three essential capabilities, technology-based firms in New Zealand could use product innovation strategy to achieve satisfactory organisational performance. Innovation and human capabilities are also useful tools to support market expansion strategies in New Zealand.

A different set of capabilities was found to be important in Malaysia. As the performance model could not provide any significant results for the Malaysian sample, it is difficult to relate resources and capabilities to performance. However, this study shows that in Malaysia, innovation capability which is strongly influenced by government policies supports market expansion strategy and the decision to remain in private ownership. Furthermore, human capability, which is influenced by a firm's human resources, and financial capability, which is influenced by resources dynamism, both support a firm's ability to change strategy because of changes in the environment. External relationships/networks have a comparatively limited role in supporting the strategies of Malaysia firms. However, the relationship between organisational capability and product innovation strategy, significant in the case of Malaysia, is similar to that found by Edelman et al. (2005) among low-technology small businesses in the United States.

The above discussion shows that the resources identified in Study 1 have impacted capabilities differently in each country. Based on the significant relationships found in Table 5-8 (Chapter 5), government policies and human resources appear to have dominating roles in building a firm's capabilities. Innovation capability and human capability are the most vital capabilities identified as supporting growth strategies. These results provide insights to firms wishing to decide the right strategy based on their resources and capabilities. This is similar to what Barbero et al. (2011) suggest. For example, if a technology firm wishes to pursue product innovation strategy to

compete in the market, its decision makers should emphasise the development of innovation and human capabilities. In order to do this they must employ the best possible talent and eagerly exploit all government support systems. Hence this study confirms the importance of 'fit' between resources, capabilities and strategies.

#### 6.3.3.2 To what extent do growth strategies and challenges affect the performance of technology-based firms?

According to the performance model examined in Section 5.8, none of the hypothesised factors were found to relate significantly to organisation performance in Malaysia. This could be due to the small sample size collected from this country. However, the model provides more implications in the New Zealand context. Two strategies and two challenges were found to relate significantly to performance. First, product innovation strategy has a positive influence on performance ($\beta$=0.45, $p<0.001$). It has a bigger influence on performance than the other factors. This result supports hypothesis H4 as well as previous studies conducted by Roper (1997); Covin et al. (2000); Coad & Rao (2008) and Coad & Holzl (2012). However the result contradicts the findings of Chandler & Hanks (1994a) and Edelman et al. (2005), who could not confirm the relationship link between innovation strategy and performance.

It was proposed in hypothesis H8a that the strategy of remaining-in-private-ownership relates negatively to a firm's performance. In fact the performance model shows a significant positive relationship between this factor and performance. Study 1 suggested that high-growth technology-based firms were willing to opt for public ownership through initial public offering (IPO) or to be acquired by bigger firms in order to gain resources for growth, and therefore remaining in private ownership would affect a firm's ability to grow. Surprisingly, the quantitative results reveal a conflicting view and reject H8a. Results ($\beta$=-0.28, $p<0.001$) imply that the strategy of remaining-in-private-ownership affects performance in a positive way. Though Lubatkin (1983) argues that related acquisitions should exhibit superior performance, this study could not provide empirical evidence for his argument. In another study, Florin et al. (2003) suggest that ventures that go public have better profitability and growth. The results of this study, however, support previous findings by Jain & Kini (1994) who found that IPO firms exhibit inferior post-IPO operating performance relative to the year prior to going public. It appears that although the motivation for going public or being acquired

is better growth performance, this is not easily achieved. Integration issues and changes of ownership might lead the firm in a different direction instead with a poorer result.

The quantitative results show that market expansion strategy had no significant relationship with performance in New Zealand, thus rejecting hypothesis H6. These results disagree with previous studies (Agrwal et al. 2012; Carmen & Langeard 1980 and Reijonen et al. 2012) discussed in Section 6.3.1. However, it is important to note that market expansion strategy is mediated fully by product innovation strategy, as the PLS-graph analysis discovered. In the absence of product innovation, market expansion strategy would have significant positive impact on the organisation's performance (Refer to Section 5.9.3). The results suggest that market expansion strategy is strongly influenced by product innovation strategy ($\beta$=0.208, $p<0.001$). As the scope of the study is technology-based firms, these results demonstrate the importance of innovation above market expansion. This was evidenced in one of the case studies in Study 1, where The Race had to refocus their innovation strength and abandon their presence in South America markets.

Among the challenges highlighted in Study 1, external environment effects, financial barriers and human capital barriers related negatively to the performance of technology-based firms. However, only external environment effects ($\beta$=-0.36, $p<0.001$) and financial barriers ($\beta$=-0.19, $p<0.05$) had significant relationships to performance. Hence, hypotheses H10b and H12 are supported in New Zealand. The effect of financial barriers on performance is consistent with previous studies (Garnsey & Heffernan 2005b; Moreno & Casillas 2007, Mason & Brown 2012). The business environment provides a window to market opportunities and threats (Yan 2010), so it is not surprising that the performance of technology-based firm is affected by these dynamics. External environment effects become the second most influential factor affecting performance, which is consistent with the finding of Covin et al. (2000). However, industry competition does not significantly relate to organisation performance.

As discussed, the performance model which was validated in the regression analysis justifies the importance of strategies and challenges to organisational performance.

Factors influenced by resources-based capabilities at organisation level are just as vital as environment factors. In order to have above-average performance, a firm has to manage its resources efficiently by choosing the appropriate strategies as well as overcoming the internal and external challenges it faces. Results from this study do not differentiate the importance of resources, capabilities, strategies and challenges to performance, but provide a comprehensive view that performance is related to many factors. Performance variation can be explained only by a firm's abilities to manage positive drivers and overcome negative forces.

### *6.3.4 Path Analysis of the Model*

Path analysis based on the Partial Least Square (PLS) approach was used to examine the overall effects of resources, capabilities, strategies and challenges on organisational performance. As the performance model for Malaysian firms could not provide any significant revelations, the path analysis examined New Zealand firms only. All the variables involved were validated with appropriate criteria. The structural model built on the dimensions mentioned was similar to what was found in the regression analyses. However, a number of relationships which were not significant in regression analysis had significant structural paths in PLS. To ensure consistency with the regression analysis, these paths were not considered in the subsequent path analysis.

Two mediators were found in the structural paths. Resources dynamism was found to partially explain the relationship between government policies and innovation capability, as well as that between human resources and human capability. On the other hand, product innovation strategy fully mediated the relationship between market expansion strategy and performance. In other words, market expansion strategy influences organisational performance, but this relationship can be fully explained by product innovation strategy. This interaction between innovation and market expansion has been widely debated and appears to be a chicken-and-egg situation. Guan & Ma (2003) and Ito & Pucik (1993) reason that research and innovation activities improved export performance in China and Japan respectively. However, Kafouros, Buckley, Sharp & Wang (2008); Hitt, Hoskisson & Kim (1997) and Kobrin (1991) have a different perspective. They argue that internationalisation helps to generate resources and provides opportunities for innovation. The mediation analysis from this study supports the first proposition that innovation should come before the firm expands to

wider markets. This is a reasonable outcome as the study focuses on the technology industry where innovation is a vital competitive element.

The path analysis based on the PLS-graph has managed to differentiate high-growth and non-high-growth firms as explained in Section 6.3.2. In addition, it shows the mediating effect between the constructs. The analysis proves that the effect of market expansion strategy on performance can be full explained by product innovation strategy. Technology-based firms should prioritise the development of innovative products, and then work on market expansion or internationalisation.

## 6.4 Summary of the Main Findings

The main findings from this study can be summarised from two perspectives and three research questions. Study 1 examined Research Question 1 from a qualitative perspective. Though it could not differentiate between sustained high growers and non-sustained high growers, it provides a comprehensive picture of how these firms achieved high growth. In addition, it explores the high-growth experiences of a selected group of technology-based firms in two countries with diverse cultures and geographical locations. Many similarities were found between their experiences, with the exception of the different government approaches on technology policies. Four key dimensions: internal and external resources, capabilities, strategies and challenges, were identified as determinants of growth performance. With the understanding of resource-based theory and strategy-performance link, a research framework was developed in Chapter 4 (Figure 4.1). It is theorised that the high-growth firms achieved their current positions by acquiring resources, developing capabilities, crafting growth-driven strategies and managing external and internal challenges. Through these continuous efforts they achieved more than 20% sales growth rate for at least 3 consecutive years. There were several elements found in each dimension that contributed to high growth performance. Research questions 2 and 3 were developed following the identification of these elements. A number of hypotheses were formulated to answer the research questions.

Study 2 validated Research Question 2 and 3 from a quantitative perspective. Statistical analyses were conducted to explain the relationship between the four dimensions.

Results proved that there were both similarities and differences between the two countries as well as different growth categories. As explained in Research Question 2, this study offers a better understanding of high-growth technology-based firms by differentiating them from non-high-growers. It finds that high growers experience stronger impacts from growth challenges than non-high growers do. The conceptual model developed in Study 1 is a better explanation for high growers. Thus the study suggests there are different resources, capabilities, strategies and challenges for non-high-growth firms in the technology industry.

Table 6-1 presents the summary for Research Question 3 and hypotheses. Most of the hypotheses were not fully supported except for $H_{1b,}$ which proves that both countries acknowledge the importance of human resources. Due to the five elements in the capabilities dimension, the majority of hypotheses were partially supported in both countries. The empirical results led to several significant findings. Firstly, they generalise the findings derived from the qualitative perspective in Study 1. As there were limited responses from Malaysian firms, few conclusions could be made in this context. However, this study confirms the relationships between resources-capabilities, capabilities-strategies, strategies-performance and challenges-performance in New Zealand firms. Though not all the elements were found to have significant effects, the results reveal the importance of government policies, human resources, external relationships/networks and resources dynamism in building innovation capability marketing capability and human capability. With these three capabilities, product innovation strategy and market expansion strategy can be supported. The results also show that the two greatest challenges to overcome are financial barriers and external environment effects. Finally, this study discovered that a firm's decision to let go of private ownership might not lead to the performance expected. It shows that remaining-in-private-ownership has a positive relationship to a firm's performance. Though the decision to move from private ownership is often linked to a firm's desire for greater financial and resources support in order to grow, the survey found a negative relationship with organisation performance.

**Table 6-1 Summary of Research Question 3 and Hypotheses**

| ***Hypothesis*** | **Research Question3: What are the influences of resource-capabilities, strategies and growth challenges from internal and external environment on growth performance*?*** | ***Supported NZ*** | ***Supported MY*** |
|---|---|---|---|
| | ***To what extent do resource-capabilities influence the growth strategies?*** | | |
| $H_{1a}$ | Government policies influence technology-based firms' ability to use resources dynamically (resources dynamism). | x | x |
| $H_{1b}$ | Human resources influence technology-based firms' ability to use resources dynamically (resources dynamism). | ✓ | ✓ |
| $H_{1c}$ | External relationships/networks influence technology-based firms' ability to use resources dynamically (resources dynamism). | x | x |
| $H_{2a}$ | Government policies are related positively to the capabilities of technology-based firms. | $✓_p$ | $✓_p$ |
| $H_{2b}$ | Human resources are related positively to the capabilities of technology-based firms. | $✓_p$ | $✓_p$ |
| $H_{2c}$ | Resources dynamism is related positively to the capabilities of technology-based firms. | $✓_p$ | $✓_p$ |
| $H_{2d}$ | External relationships/networks are related positively to the capabilities of technology-based firms. | $✓_p$ | $✓_p$ |
| $H_{3a}$ | Internal capabilities are related positively to the product innovation strategy of technology-based firms. | $✓_p$ | $✓_p$ |
| $H_{3b}$ | Internal capabilities are related positively to the niche focus strategy of technology-based firms. | n/a | n/a |
| $H_5$ | Internal capabilities are related positively to the market expansion strategy of technology-based firms. | $✓_p$ | $✓_p$ |
| $H_{7a}$ | Internal capabilities are related positively to the remaining-in-private-ownership strategy of technology-based firms | x | x |
| $H_{7b}$ | Internal capabilities are related negatively to the acquisition of technology-based firms. | n/a | n/a |
| $H_{9a}$ | Internal capabilities are related positively to strategy flexibility of technology-based firms. | $✓_p$ | $✓_p$ |
| | ***To what extent do growth strategies and challenges affect the performance of technology-based firms****?* | ***Supported NZ*** | ***Supported MY*** |
| $H_{4a}$ | Product Innovation strategy is related positively to the performance of technology-based firms. | ✓ | x |
| $H_{4b}$ | Niche-focus strategy is related positively to the performance of technology-based firms. | n/a | n/a |
| $H_6$ | Market expansion strategy is related positively to the performance of technology-based firms. | x | x |
| $H_{8a}$ | The remaining-in-private-ownership strategy is related negatively to the performance of technology-based firms. | x | x |
| $H_{8b}$ | Acquisition strategy is related positively to the performance of technology-based firms. | n/a | n/a |
| $H_{9b}$ | Strategy flexibility is related positively to the performance of technology-based firms. | x | x |
| $H_{10a}$ | Industry competition affects the performance of technology-based firms. | x | x |
| $H_{10b}$ | External environment affects the performance of technology-based firms. | ✓ | x |
| $H_{11}$ | Human capital is related positively to the performance of technology-based firms. | x | x |
| $H_{12}$ | Available finance is related positively to the performance of technology-based firms. | ✓ | x |

*$✓_p$ indicates a partial support for the hypothesis; n/a: not available*

The quantitative analysis also suggests that product innovation strategy has a greater impact on organisation performance than market expansion strategy does. This is because it has a full mediating effect on market expansion strategy towards performance. In addition, the interaction effects of high-growth firms are stronger, indicating that the research model is better explained by this group of firms. The quantitative analysis confirms a difference between high-growth and low-growth firms in their business experiences, especially in the way they manage resources, capabilities, strategies and challenges.

### 6.5 Managerial Implications

The study provides a more in-depth understanding of performance, especially from the high-growth perspective. This is shown by qualitative findings from Study 1 and empirical results of the structural model with stronger predictive power among high-growth firms in New Zealand. From the experiences of high-growth technology-based firms, it is noted that internal and external resources are very important in fostering above-average performance. These resources help to build up internal capabilities that influence strategy implementation and organisation performance. Thus, decision-makers in technology-based firms and other businesses should take advantage of resources such as government and external relationships/networks available from the external environment. They should act progressively towards government funding opportunities or other types of assistance. Managers should also seize every opportunity to network with related stakeholders such as suppliers, customers, partners and even competitors. This study provides affirmation of the importance of policy-makers to the performance of technology-based firms. The mediating relationship between product innovation strategy and market expansion strategy reveals the connection between the two strategies. It is more effective to first produce first-class innovation that can easily support market expansion or internationalisation initiatives. Internal resources such as human resources are also important, therefore technology-based firms should continue to acquire talent in technical and managerial areas.

The empirical results identify three vital capabilities, innovation capability, marketing capability and human capability that have direct effect on strategies. Therefore, managers in technology-based firms should emphasise the development of these three

capabilities. Effort should be put into research and development activities, new product development, customer service/management, market knowledge, human capital development and human resources practices. Government policy-makers should channel resources into research funding and technical training schemes, as government policy was found to have a significant relationship to the innovation capability and human capability of technology-based firms. By channelling resources to critical areas, governments could help technology-based firms to reap greater returns, thus improving the national economy.

The empirical results also recognise three major strategies for growth: product innovation strategy, market expansions strategy and remaining-in-private-ownership. It is important to note that the success of market expansion strategy is tied to product innovation strategy, while the decision to remain in private ownership relates positively to performance. Technology-based firms should give priority to product innovation strategy. If they can implement this strategy successfully it will be easier for them to expand into new markets both domestically and internationally. However they should not rush towards market expansion unless their products/services are innovative enough for the marketplace. It is more effective to allocate resources to product innovation initiatives than to explore new market territory. They should also be mindful of the consequences of public ownership or acquisition in order to fund for growth. There may be many underlying issues that could hinder their performance in the long run.

Finally, the study identifies two challenges that negatively impact on performance: financial barriers and external environment effects. These were found to have a big influence on the performance of technology-based firms, especially high-growth firms. Thus it is important for managers in technology-based firms to devise ways to overcome these challenges. Managers should be aware of political, social, demographic and technological changes in the external environment. Their decisions about resources, capabilities and strategies, should reflect this awareness. Change usually presents either new opportunities or threats, so they should be aware of environment dynamism. Managers should also keep track of their firms' profitability and cash flow. Although business turnover might be encouraging, insufficient funds to sustain current market share could eventually affect performance so managers should strive to

overcome the financial barriers that arise from enormous growth or limited profitability generated in new market territory.

### 6.6 Theoretical Implications and Contributions

This study offers several contributions to the literature in the areas of strategic management and entrepreneurship. First, it enriches understanding of the resource-based view popularised by Penrose (1959), Wernerfelt (1984) and Barney (1991) by linking it to capabilities, strategies and performance. This study uses qualitative and empirical results to validate the relationship between these elements. It reveals the direct relationships of resources and capabilities, capabilities and strategies, strategies and performance. It also provides a path analysis of related dimensions to explain organisational performance. In addition, this study provides a bridge between strategic management concepts and theories of high growth (Birch 1979; Acs & Mueller 2008). The study offers evidence of how high-growth businesses apply strategic management concepts to achieve high-growth performance. It can be considered one of the first to combine several strategic management dimensions in the study of high-growth business. In addition, this study identifies specific resources that help to build specific capabilities, and recommends the requisite capabilities for particular growth strategies. It further enhances the work of Barbero et al. (2011) by recommending the resources needed for each capability.

Previous literature (Lambrecht & Pirnay 2005; Yiu, Bruton & Lu 2005 and Mole et al. 2008) questions the impact of government policies but this study confirms their importance to business performance. Thus it supports research conducted by Czarnitzki (2006); Mason & Brown (2011) and Greene (2012). Furthermore, this study finds that different approaches to government policy lead to different outcomes. Another academic contribution from this study is the importance of product innovation strategy above market expansion strategy. The empirical results support the literature that suggests research and innovation improve rather than detract from market performance.

Most studies on high-growth business and organisation performance have been conducted in United States and Europe. There have been limited studies of the Asia Pacific although this region has grown tremendously, especially since the financial

crisis in U.S and the debt crisis in Europe. This study contributes to the current literature by proposing a different view of the Asia Pacific environment. It reveals the dimensions and elements for growth in a highly competitive industry and environment. Furthermore, it demonstrates a comprehensive performance model by examining the interaction effects of the relevant elements. Finally, the model differentiates high-growth and non-high-growth businesses with a different $R^2$ value, where the performance model is better at predicting high-growth business. It suggests that resources, capabilities, strategies and challenges are managed differently in non-high-growth businesses. As suggested by many entrepreneurial-orientated studies (Lumpkin and Dess 2001; Richard, Barnett, Dwyer & Chadwick 2004; Rauch, Wiklund, Lumpkin & Frese 2009), their performance is also highly motivated by business ambitions.

## 6.7 Summary

This chapter discusses the results obtained from interviews and survey. The discussion is drawn from findings in Chapter 4 and 5 to provide answers to the research questions. From the discussion in the interviews, it appears that high-growth firms in both New Zealand and Malaysia have similar experiences. However, a greater sample of technology-based firms in both countries shows that the effects of interaction between strategic management dimensions are quite different. Subsequently, the chapter presents the main findings from both studies. It concludes with a discussion of the implications of the study which highlights both managerial and theoretical contributions. The overall conclusions, limitations of the study and future directions for research are discussed in the next chapter.

# CHAPTER 7 CONCLUSIONS

## 7.1 Overview

This chapter presents a summary of each of the preceding six chapters. It discusses the limitations of the study and makes recommendations for future research. The remarks in the last section conclude this thesis.

## 7.2 Summary of the Research

The first chapter lays the foundation for this study. It offers an overview of the growing technology industry in the Asia Pacific region. Chapter 1 discusses the importance of this growing industry as well as the significance of high-growth businesses in two selected countries, New Zealand and Malaysia. This discussion is followed by an overview of high-growth business and opportunities to understand more of the high-growth phenomenon. As most studies of high-growth business and organisation performance are centred on Europe and Northern America, the chapter discusses the need for more realistic and practical understanding of business performance in the fast-growing Asia Pacific region.

Chapter 2 offers a comprehensive discussion on previous literature covering strategic management and entrepreneurship research. It studies the high-growth scenario by looking at the growth measures, patterns and factors identified in previous studies. This chapter also examines high-growth business from a strategic management viewpoint by discussing resources-based capabilities, the strategies-performance relationship and growth challenges. By comparing and reviewing previous studies, the author identified a gap in the research: it was necessary to look at high-growth business from more than one perspective. Previous research mostly identifies growth factors through one or two dimensions only, and does not examine the interaction between the dimensions. Therefore, this study first explores the dimensions relating to high-growth business in a highly volatile industry, and then tests the influences of these dimensions empirically. Three research questions were developed: 1) What are the key characteristics of high-growth technology-based firms in these countries? 2) How do high-growth firms differ from non-high-growth firms? 3) What are the influences of resource-capabilities,

strategies and growth challenges from the internal and external environment on performance?

Chapter 3 develops a research approach to define and answer the research questions set out in Chapter 2. This chapter lays out the research paradigm and methods used in this study. Due to the nature of the research questions, a exploratory sequential mixed methods design was adopted. A detailed discussion of the method is presented, and the chosen approach and statistical analysis method are justified.

Chapter 4 describes the findings from case study interviews with selected award-winning high-growth companies. These findings identify and confirm the dimensions that influenced high-growth firms both in New Zealand and in Malaysia. From the interviews it was found that internal and external resources, capabilities, strategies and growth challenges had affected their business performance. It was found that the high-growth firms achieved their current position by acquiring resources, developing capabilities, crafting growth-driven strategies and managing external and internal challenges. A number of hypotheses were developed to provide empirical support for these claims. Some of the interview headings were used in the survey instrument. The research model for this study was finalised from the findings in Chapter 4.

The next chapter tests the hypotheses developed in Chapter 4 with survey findings from a group of technology-based firms with mixed growth performance. Chapter 5 discusses the empirical results based on two sample groups, one from New Zealand and one from Malaysia. The relationships between resource-capabilities, capabilities-strategies, strategies-performance, and challenges-performance were validated using regression analysis. Based on the regression models, path analysis was conducted using the PLS-graph approach to examine the interaction between the dimensions mentioned. Due to a limited number of responses from Malaysian firms, the main findings could only be explained using the New Zealand samples. The results reveal the importance of government policies, human resources, external relationships/networks, and resources dynamism in building the research capabilities, marketing capabilities and human capabilities of a firm. Product innovation strategy has a positive significant relationship to organisation performance, while market expansion strategy has no significant impact as it is fully mediated by product innovation strategy. On the other hand, financial

barriers and external environment have significant negative effects on performance, and a firm's decision to let go of private ownership might not result in the performance expected. Furthermore, the empirical results differentiate high-growth and non-high-growth firms in their interactions with strategies and challenges. The research model developed in Chapter 4 has a higher predictive power for high-growth firms, indicating different growth experiences for non-high-growth firms.

In Chapter 6, the results from the interviews and questionnaires are compared with findings from previous studies. The research purpose is reviewed to show how it connects with the research questions. A summary of the hypotheses and test results for each research question is provided in this chapter. The study implications are discussed in terms of three perspectives: managerial, policy-maker and theoretical. By using qualitative and quantitative results, this study offers valuable insights to technology business owners by recommending priorities for their resources, capabilities and strategies. It also suggests to policy-makers the most effective forms of government assistance. From a theoretical perspective, this study has successfully enriched the body of knowledge by confirming the importance of strategic management in high-growth businesses, and by detailing the critical determinants of performance with their empirical results.

## 7.3 Research Limitations

This study does have a number of theoretical and empirical limitations. First of all, the study is focused on phenomenon in selected industries and countries, so it may not be valid in other contexts. Factors such as environmental differences, extent of government interventions and industry characteristics could suggest a different set of growth strategies for another location. Findings from the case studies and questionnaire survey may not be applicable to other countries in different regions.

The second limitation concerns the respondents from the questionnaire survey. The low response rate from both countries (New Zealand=18.2%; Malaysia=5.3%) may not represent the general opinion of all technology-based firms in those countries. As a result, the findings from this research are based on the limited sample. However, the low response rate is common in surveys of top managers on strategy issues, and

previous studies have reported similar response rates. Since the research is on strategic management issues, only top managers/CEOs were suitable respondents for the survey, therefore only one respondent in each firm was targeted. This might have resulted in data bias if the decision-makers were more inclined to report optimistic or positive information, although we found no evidence to suggest common methods bias.

According to the exploratory sequential mixed methods design, the initial case study interviews were conducted with high-growth technology-based businesses in both countries. There would have been greater consistency if the research model developed from these interviews was tested on a similar pool of successful high-growth performers. This could not be done in practice because of the limited number of high-growth technology-based businesses awarded Deloitte Technology Fast 500 Asia Pacific Ranking in the two countries. The survey population targeted all technology businesses in New Zealand and Malaysia, therefore the findings from the empirical results cannot be consistent with the model developed in earlier case studies. However, the quantitative findings offer strong evidential explanations of the differences between high-growth and non-high-growth firms in the New Zealand context.

The final limitation relates to the measurement scales developed from case study interviews. As some of the measures were derived from interview headings and have never been tested in other studies, they were discarded after failing the reliability tests or producing low communalities or cross-loadings. These measures include niche-focus strategy and growth by acquisition. Although their effects on business performance are undeniable, these measures could not be used in the regression analysis. Consequently, caution should be exercised when the results presented in this study are extended to predictions of business performance.

### 7.4 Recommendations for Future Research

Based on the limitations explained earlier, several recommendations can be made for future research. The model tested in this study has successfully demonstrated the interactions among different strategic management dimensions in the New Zealand context. It would be valuable to generalise these findings by replicating the model in studies conducted in other parts of the world. In addition, this would provide future

researchers with a more comprehensive comparison among countries. Because this study focuses only on growth experiences in the technology industry, it could be replicated in other highly-volatile industries such as the airline, pharmaceutical or energy industry. However, a different set of dimensions or variables would need to be identified to suit the particular industry selected.

It is also suggested that other variables such as industry structure and strategy implementation issues, which were not considered in this study, could be examined in future research. These variables could provide different perspectives on business growth. Due to geographical and resources constraints this study could not observe such variables in detail, however it is hoped that future studies might offer more insight into how these variables influence the performance of organisations. It is also suggested that future surveys be sent to two target respondents in a firm, one a top manager and the other a first-line manager. This would allow cross-validation on the data and offer a more comprehensive view of the firm's growing experiences from different perspectives. In this way the bias mentioned in the research limitation section could be reduced.

### 7.5 Concluding Remarks

There is a Chinese saying that success requires three important elements: *Tian Shi* 天时 (right time), *Di Li* 地利 (right place) and *Ren He* 人和 (right people). This could be linked to the findings in this study. High-growth performance is highly related to the right opportunity, especially in terms of environmental change and overcoming challenges; getting the right resources and capabilities by being at the right place; and finally getting the right people to craft and implement appropriate strategies for above-average performance. Thus it is hoped that this study will be a useful tool for business owners, that it will direct their attention to the correct path and help them reap the reward of sustained business growth.

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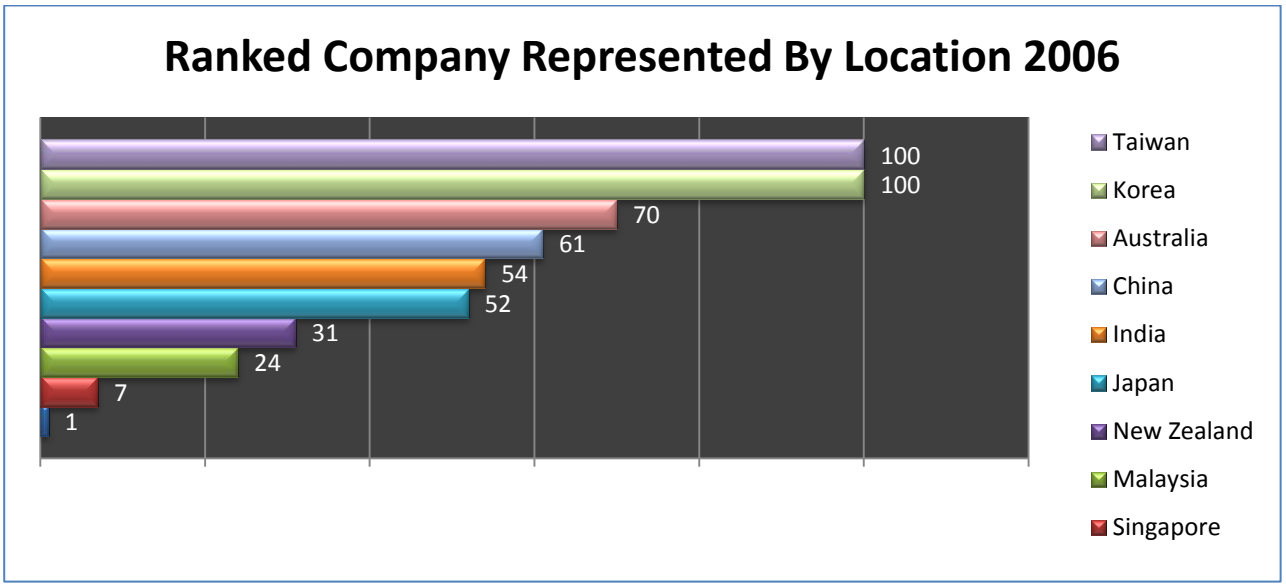
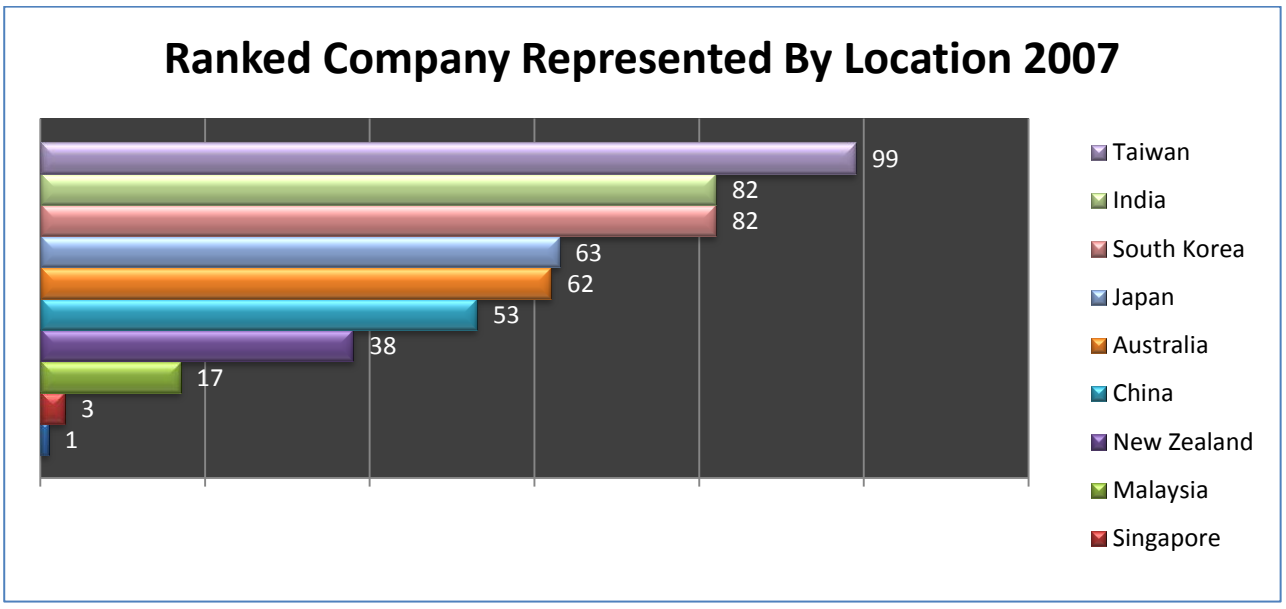
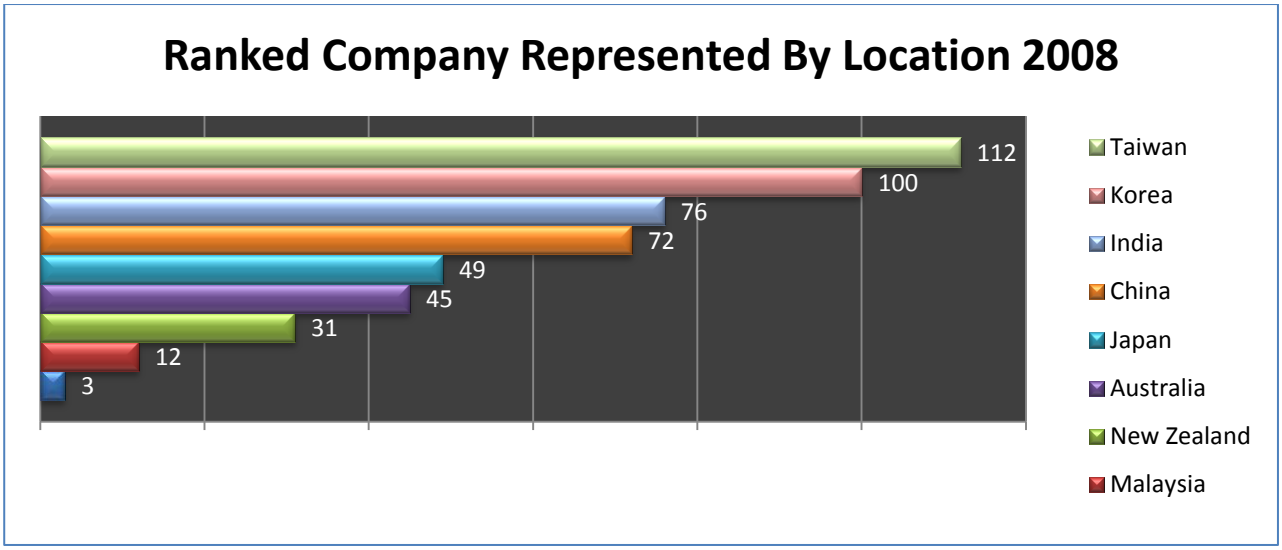
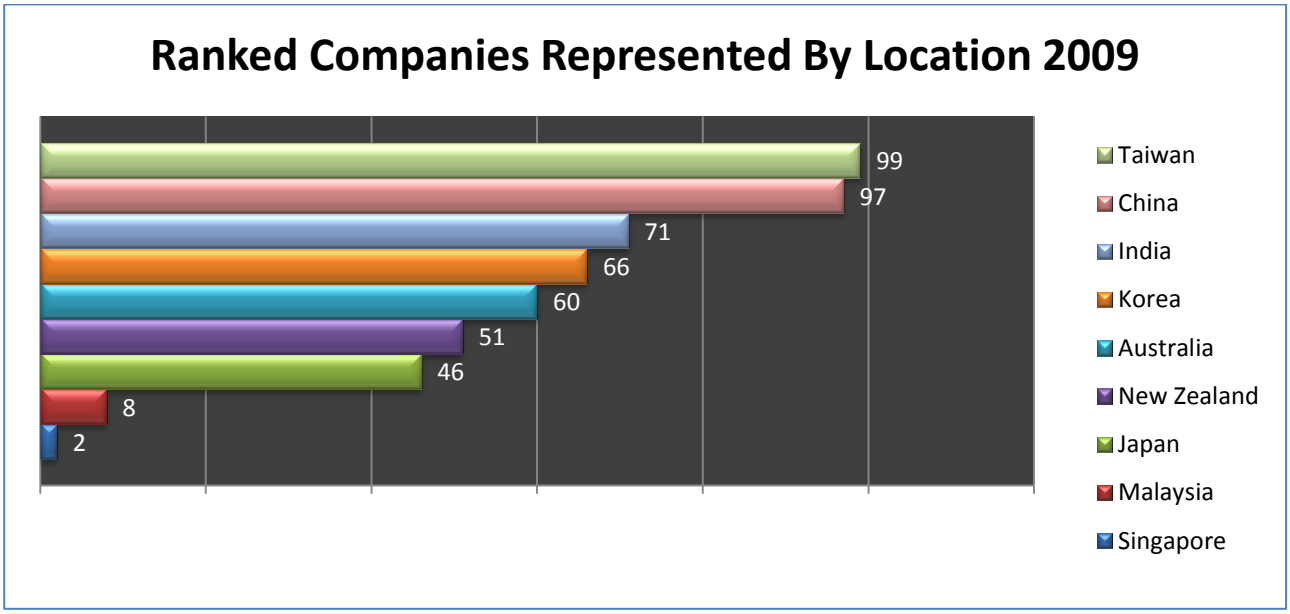
**APPENDIX A: Deloitte Fast 500 Asia Pacific Ranking 2006-2009**




Ranked Company Represented By Location 2008
112
100
76
72
49
45
31
12
3
Taiwan
Korea
India
China
Japan
Australia
New Zealand
Malaysia


Ranked Companies Represented By Location 2009
99
97
71
66
60
51
46
8
2
Taiwan
China
India
Korea
Australia
New Zealand
Japan
Malaysia
Singapore

## APPENDIX B: New Zealand Business Demography Statistics

### Table 1 High Growth Enterprises (HGEs) analysed by ANZSIC06 division

| ANZSIC'06 division | Year | | | | | | |
|---|---|---|---|---|---|---|---|
| | **2005** | **2006** | **2007** | **2008** | **2009** | **2010** | **2011** |
| A - Agriculture, Forestry & Fishing | 84 | 71 | 84 | 95 | 99 | 84 | 73 |
| B - Mining[1] | 8 | 6 | 10 | 7 | 7 | 9 | 10 |
| C - Manufacturing | 176 | 166 | 134 | 127 | 86 | 61 | 60 |
| D - Electricity, Gas, Water and Waste Services[2] | - | - | - | - | - | - | - |
| E - Construction | 145 | 120 | 123 | 94 | 75 | 52 | 66 |
| F - Wholesale Trade | 87 | 76 | 61 | 67 | 53 | 44 | 43 |
| G - Retail Trade | 98 | 79 | 66 | 67 | 34 | 42 | 46 |
| H - Accommodation and Food Services | 73 | 85 | 72 | 93 | 76 | 58 | 63 |
| I - Transport, Postal and Warehousing | 64 | 56 | 46 | 41 | 30 | 37 | 28 |
| J - Information Media and Telecommunications | 14 | 13 | 15 | 21 | 9 | 7 | 7 |
| K - Financial and Insurance Services | 24 | 31 | 19 | 21 | 11 | 11 | 7 |
| L - Rental, Hiring and Real Estate Services | 34 | 23 | 16 | 20 | 13 | 9 | 8 |
| M - Professional, Scientific and Technical Services | 72 | 86 | 86 | 91 | 76 | 60 | 71 |
| N - Administrative and Support Services | 85 | 75 | 74 | 82 | 51 | 44 | 41 |
| O - Public Administration and Safety | 11 | 14 | 15 | 12 | 10 | 8 | 12 |
| P - Education and Training | 60 | 48 | 82 | 82 | 114 | 134 | 67 |
| Q - Health Care and Social Assistance | 47 | 51 | 60 | 75 | 80 | 73 | 51 |
| R - Arts and Recreation Services | 23 | 28 | 23 | 32 | 25 | 24 | 22 |
| S - Other Services | 20 | 23 | 26 | 40 | 30 | 24 | 25 |
| **Total** | **1,125** | **1,051** | **1,012** | **1,067** | **879** | **781** | **700** |

## Table 2 Number of High Growth Enterprise (HE) Drop-out based on cohort 2005

| Status of cohort enterprise | Year | | | | | | |
|---|---|---|---|---|---|---|---|
| | **2005** | **2006** | **2007** | **2008** | **2009** | **2010** | **2011** |
| HGE | 1125 | 369 | 180 | 54 | 39 | 29 | 25 |
| Drop-out | - | 756 | 945 | 1071 | 1086 | 1096 | 1100 |
| Total | 1,125 | 1,125 | 1,125 | 1,125 | 1,125 | 1,125 | 1,125 |

## Table 3 Number of High Growth Enterprise (HE) Drop-out based on cohort 2008

| Status of cohort enterprise | Year | | | |
|---|---|---|---|---|
| | **2008** | **2009** | **2010** | **2011** |
| HGE | 1,067 | 316 | 136 | 30 |
| Drop-out | - | 751 | 931 | 1,037 |
| Total | 1,067 | 1,067 | 1,067 | 1,067 |

**APPENDIX C: Interview Protocol**

## Letter of introduction

**University of Canterbury Letterhead**

**Department of Management**

Dear (name),

**Request for an interview**

I am undertaking a PhD in the Department of Management at University of Canterbury under the supervision of Professor Bob Hamilton.

The topic of my PhD research is 'Developing Strategies for Sustainable Fast Growth: Perspectives from the Asia Pacific'. Part of my study involves interviewing a number of CEOs or founders of fast growing companies. As your company has been awarded in the Deloitte Technology Fast 500 Asia Ranking, I would like to invite your participation in this research project. I wish to have an opportunity to talk with you about the issues of strategies, resources, industry environment and firm performance, the main themes of my PhD thesis.

I would appreciate greatly this opportunity. I will contact you further, either by telephone or email, to see if we can arrange a suitable time to meet.

Kind regards,

Poh Yen, NG
Email: pohyen.ng@pg.canterbur.ac.nz

Supported by,

Professor Bob Hamilton
email: bob.hamilton@canterbury.ac.nz

# Interview Information Sheet

**University of Canterbury Letterhead**

**Department of Management**

My name is Poh Yen, Ng and I am doing research towards a PhD under the supervision of Professor Bob Hamilton in the Department of Management at University of Canterbury. You are invited to participate as a subject in the research project: Developing Strategies for Sustainable Fast Growth: Perspectives from the Asia Pacific. This project has been reviewed and approved by the University of Canterbury Human Ethics Committee.

The aim of this interview is to understand how fast growing companies develop strategies for growth. Participants are requested to answer all questions based on their experiences and knowledge. The study seeks to develop a deeper understanding on sustainable growth.

Participation is voluntary and you are not under any obligation to answer questions that may seem too personal or intrusive. You have the right to withdraw from the project at any time, including withdrawal of any information provided. Data will be kept securely for five years from completion of my PhD in the Department of Management. You will also be able to access to your information at any time during the period. The results of this project may be published and my PhD dissertation is a public document available in the University of Canterbury library database. However, you may be assured of the complete confidentiality of data gathered in this investigation. The identity of participants will not be made public without their consent.

This in-depth interview will take approximately 1-2 hours to complete. If you have any queries regarding this project, please contact my supervisor, Professor Bob Hamilton at bob.hamilton@canterbury.ac.nz or the University of Canterbury Human Ethics Committee. A summary of research results will be available upon request.

Thank you for your participation!

Poh Yen, Ng
Email: pohyen.ng@pg.canterbury.ac.nz
Phone: 021 029 63284/ 03 944 0849
Department of Management
College of Business and Economics
University of Canterbury

# Interviewee Consent Form

Poh Yen, Ng
Department of Management
Private Bag 4800
Christchurch 8140
New Zealand

Date

**Developing Strategies for Sustainable Fast Growth: Perspectives from the Asia Pacific**

I have gained sufficient understanding of this research and agreed to participate in the interview. I hereby give permission to the University of Canterbury to use the interview information for research purposes. On this basis, I consent to publication of the results of the project with the understanding that anonymity will be preserved. I understand also that I may at any time withdraw from the project, including withdrawal of any information I have provided. I note that the project has been reviewed and approved by the University of Canterbury Human Ethics Committee.

Name:

Signature:

Company Name:

Date:

## Interview Guide

**Introduction:**

1. An overview of the case study project (objectives, issues, topics being investigated).
2. PhD study supervised by Professor Robert Hamilton.
3. Multiple case studies examining the growth strategies of technology companies.
4. Ethical considerations: explanation on information sheet and permission to audiotape the interview.
5. Questions?
6. Consent form to be signed.

**Company information**

| | | | |
|---|---|---|---|
| Company Name: | | | |
| Year founded: | | Number of founders: | |
| Name of founders: | | | |
| Number of employees: | | | |
| Subsidiaries and overseas offices: | | | |
| Last year's revenue: | | | |
| Last year's ROA: | | | |

**Interviewee information**

| | | |
|---|---|---|
| Name: | | |
| Current Position: | | |
| Gender: | | Founder: Y / N |
| Total time with firm: | | |
| Previous position: | | |
| Prior experience/employment | | |
| Highest education attained | | |

**General Questions**

1. What was the background of all the founding members? What skills and experiences did they bring to the organization?

2. Can you explain the current structure of the organization? (Are there any change over time?)

**Performance**

1. What are the organization's growth measures?
    - Change in sales
    - Change in employees
    - Change in profit/ROA
    - Change in market share
    - Change in CEO/owner compensation
    - Change in labor expense to revenue
    - Change in organization structure (e.g. number of managers, number of divisions, number of acquisitions)

2. How has your profitability been over the last 3 year? ROA? Does growth makes your organization more profitable?

3. How has the organization grown since its establishment?
    - Path (in sales revenue)
    - Modes: acquisition? Diversification? Internationalization?

4. What are the important factors that contributed to its growth?

5. How did you manage to achieve such high growth in the past 3 years?

6. What are the foreseen or unforeseen consequences of growth that you have to overcome? (Prompt: are these positive or negative consequences?)

7. What are the challenges for your company to sustain or improve current growth?

**Strategy**

1. What strategies (general, portfolio and competitive) did your organization use to achieve the current growth?

2. How did your organization develop these strategies?

3. Based on your organization experiences, what are the indicators/signals driving a strategy change to ensure growth?

4. Do changes in the business environment affect your organization's strategies? If yes, how?

5. How did your organization implement these strategies? Were there any challenges faced during their implementation?

6. Did your organization make any strategy changes as a result of the 2008 financial crisis? If yes, how? What is result of the changes?

7. How would you describe your organization's current growth strategy? (Has it changed over time?)

8. How did your organization plan and build for its current strategies?

**External environment**

- *Government*

1. Is there any government agency helping technology industry in your country? If yes, who are they?

2. Have your organization benefitted from any government policy? How?

3. What are the roles played by government in your organization growth?

- *Competitors*

4. Please describe your organization business model that differentiates from competitors, and provides competitive advantage over competitors.

5. Do you consider it is important to know what your competitors are doing? Y □ N □

6. If the answer to question above is yes, how do you keep informed about them?

7. How do your competitors operate?

- *Customers*

8. Who are your customers? Is there any change in your customer base since establishment?

9. How does your organization look for ways to create value in your products/services?

10. How does your organization maintain relationship with your customers?

11. Would you say your organization's growth is driven by customer satisfaction? How?

12. What are the roles played by customers in achieving your organization's growth?

13. How would you say your organization is different from your competitors? Why would a client choose your organization?

- *Network*

14. Is there any external advisor on developing growth for your organization? Who?

15. How important would you say your relationships with suppliers/distributors have been affecting your organization's growth?

16. Is your organization involved in any industry groups, bodies or network? (Prompts: how many? What groups? What activities?) What do you find to be the most useful? Why?

17. Does your organization have formal or informal collaborative partnership/strategic alliances with any organization? Who and what are they?

18. Are there any knowledge transfer or replication activities happened between your organization and external partners? If yes, what are they?

- *Economic*

19. What are the effects of national economy on your organization growth?

20. Does the fluctuation of New Zealand dollar exchange rate affect your organization growth? If yes, how?

21. What are the effects of global economy on your organization growth?

22. How did your organization manage sources of finance to pursue business growth?

- *The industry*

23. How would you say the industry your organization competing in has changed over the last 10 years in NZ/Malaysia?

24. What are your responses to these changes in strategy and resources?

25. How did these changes help in your organization growth?

26. In your opinion, what are the outlooks of this industry in your country? How does it going to affect your organization growth?

27. Based on the external environment, what are the opportunities and threats affecting your organization growth?

**Internal Environment**

- *Capabilities*

1. What are the strengths and weaknesses of your organization?

2. Do different department share resources? How?

3. Have you purposefully create, extend, or modify resources? If yes, please explain the reasons. How did your organization do that? Are they effective?

4. Were employees involved in decision making of building firm capabilities?

5. When your started this organization, did you have a formal written vision? Y □ N □

6. Do you currently have a formal written organization vision? Y □ N □

7. If yes, what are they?

8. How does your organization articulate the vision to its employees?

9. Who are in your top management team? What are their expertises?

10. What are the roles played by top management in pursuit of business growth?

11. How does the current organization structure encourage growth?

12. Would you say there is total agreement with your business vision across all levels, functions and divisions? How?

13. Are there any shared assumptions that you have had about the way you do business? Please give an example.

14. Is there a specific culture/climate in your organization? What? How does the culture affect your organization's growth?

15. Please tell me about your organization recruitment and remuneration practices.

16. How important is training and development in your organization?

17. What kind of qualification does your staff possess?

18. What is the current staff turnover?

19. In your opinion, why do people stay in your organization?

20. How do the current HR practices encourage employees to achieve higher growth for your organization?

21. Does your organization do much in the way of marketing?

22. What sort of marketing strategies (research, customer knowledge) does your organization engage in?

23. How has that changed over this time period? Please evaluate the effectiveness of change.

24. How important is marketing to your organization?

25. What would you say your organization's image is like?

26. How much does your organization spend on R&D every year? What is the percentage over sales? What is the percentage of employee involved in R&D activities?

27. What was your organization first innovation/product? What is the latest? What are the differences in organization's product offering?

28. What are the new processes and systems used in your organization in the last 3 years? How were they developed?

29. What are the efforts involved in building technology and innovation in your organization? Are there any involvements of external experts or industry advice?

30. Is knowledge management important to build innovation capability? If yes, how? Why?

31. How often do you update your products?

32. Are original ideas highly valued in your organization? How?

33. How do you encourage your employees to be constantly thinking and innovative?

34. Would you say there is an emphasis on constant innovation?

35. How do you manage to stay innovative?

**Final questions:**

1. What do you think your organization's growth path might like look over the next 3-5 years?
2. Anything else you would like to add or anything important to the subject that we haven't covered?
3. How would you like to receive the transcript, email or post?

## APPENDIX D: Comparative Analysis by Country

| Dimension | Category | Sub-category | *Findings/Remarks* |
|---|---|---|---|
| Company Profile | Year Founded | New Zealand | 1990-1999 (4)<br>2000 & after (4) |
| | | Malaysia | 1990-1999 (3)<br>2000 & after 5 |
| | Number of Founder | New Zealand | 2-5 founders (all) |
| | | Malaysia | 1 founder (2)<br>2-5 founders (6) |
| | Founders experiences* | New Zealand & Malaysia | *Founders in all companies interviewed have relevant work experiences in IT or related industry.* |
| | Founders=CEO* | Non-founder CEO:<br>NZ (4)<br>Malaysia (1) | *NZ has more inclination to invite new management talent.* |
| | Subsidiary<br>Overseas ventures* | NZ (3)<br>Malaysia (5) | |
| | | <u>Ongoing</u><br>NZ: (6)<br>Malaysia (6)<br><u>Planning</u><br>NZ (1)<br>Malaysia (1) | *Foreign market expansion is important* |
| | Number of Employees* | New Zealand | Less than 50: (5)<br>50-100: (1)<br>101-150: (2) |
| | | Malaysia | Less than 50: (3)<br>50-100: (2)<br>101-150: (1)<br>More than 150: (2) |
| | Organizational structures | 1. Non-hierachy: one M'sia<br>2. CEO rotation: one NZ<br>3. Functional: all except no. 1<br>4. Subsidiaries/business unit: two NZ; one M'sia<br>5. Geographical: two NZ, one M'sia | *Functional structure is dominant, only few companies incorporated subsidiaries and geographical structures* |

| Dimension | Category | Sub-category | *Findings/Remarks* |
|---|---|---|---|
| Performance profile | Growth Measures | • Sales (16)<br>• Profit (11)<br>• Market share (4)<br>• productivity (3)<br>• product performance (2)<br>• number of employees (2)<br>• employee skills (1)<br>• key success factor (1) | *No difference in country, used more than one measures* |
| | Profitable Growth | Majority (10) did not agree that high growth will bring greater profit except one company in M'sia 2 in NZ. Reasons: need to fund the growth, profit can outgrown growth, depends on the cost structures. Two companies in NZ (1s, 1 ns) experienced losses during fast growth periods. | *No difference in country* |
| | Growth Modes* | Internationalization or market diversification is most popular, followed by acquisitions (4NZ: 2s, 2ns), none involved in business diversification. Change in business ownership: acquisition (2NZ s), IPO (2Ms, 2M ns, 1Nz ns), venture capital (1M ns). | *No difference in country* |
| | Growth Paths | Growth paths have been steadily upward with some explosive and organic growth during the award periods. Experienced plateau growth during start up or recent financial crisis for 3 M'sia companies. | *No difference in country* |
| | Growth Consequences | 1. Finding right people*<br>2. Lost existing market share<br>3. Problem in managing growth: cash flows*, customer expectation, human capital, management structure, market, new technology | *Finding hard to manage finance and people as a result of fast growth; no difference between countries* |
| | Growth Factors* | 1. Product offering (N5, M4)<br>2. Market change (N5, M5)<br>3. Gaining new customers (N4, M2)<br>4. Deliberate strategies (N1, M2)<br>5. Aim to be big (N3)<br>6. Business philosophies (M1, N1)<br>7. Market leader (N1, M1)<br>8. Partnership(M2)<br>9. Patent protection (N2, M2)<br>10. Human capital(N2, M1)<br>11. Organization cultures (M1)<br>12. Innovation (M1) | *Majority contributed fast growth to internal capabilities, no difference between countries* |
| | Growth Challenges | 1. People (N3, M7)<br>2. Finances (N4, M2)<br>3. External environment (N2, M2)<br>4. Product development (N2, M1)<br>5. Time frame for sales (N1, M2)<br>6. Clear future directions (N2, M1)<br>7. Management structures (M2)<br>8. System manage growth (N2)<br>9. Competition (M1)<br>10. Customer expectations (M1) | *No difference between countries* |

| Dimension | Sources | Property/concept | *Resources/activities* |
|---|---|---|---|
| External environment | Network | External advisor | 7 companies do not have (3N4M).<br>Other companies used for advisors for industry research, tax advices, non-board advisory and peer group support. |
| | | External collaborations* | Only 3 NZ companies have no collaborations.<br>Forms of collaborations: new product testing, new technology development, new solutions development, solution partnership for a project, outsourcing work, market alliances, resources sharing. |
| | | Industry affiliations | 2 companies from NZ & M'sia respectively not involved. Majority involved but found limited benefits in the involvement. |
| | | Supplier/resellers relationship | Only 1 company in M'sia (ns) has no such relationship. The rest found it important either with contract manufacture, hardware suppliers or product resellers. |
| | | Knowledge transfer* | Only 3 companies have no knowledge transfer (same as external collaboration). The rest are involved within business partners or within business units. |
| | Competitors | Profile | Global player(4M4N)<br>Numerous (2N 6M)<br>Closer to customers (1N)<br>Not specialised(3N1M)->not fulfil needs (4N1M)<br>Follower of technology(1M)->slow to recognise needs (2N1M)<br>Clients (1N) |
| | | Differentiation* | Niche needs (4M3N)<br>Technology used(4M1N)->company websites (1N)<br>Focus on things good at(2N1M)<br>IP (2N)<br>Distribution model(2N1M)<br>Strategic partnership (1N1M)<br>Experience(2M)<br>Customer perceptions(1N) |
| | | Dynamics | Majority keep track of competitors via self-initiatives or customers, only 2 NZ companies not keeping track.<br>Reactions to competitors were limited as most are technology leaders, not followers. |
| | Government | New Zealand | • International expansion (3)<br>• R& D grants (3)<br>• Business advices (2)<br>• Marketing grants(1)<br>• Limited role (5) |
| | | Malaysia | • MSC status tax exemption (8)<br>• Technology policies (3)<br>• International expansion (3)<br>• R&D grant (1)<br>• Marketing grants (1)<br>• Subsidise intern wages (1)<br>*Only 2 companies in M'sia received other than tax exemption benefits. Only 1 NZ (s) did not receive any direct benefits from government.* |

| Dimension | Sources | Property/concept | *Resources/activities* |
|---|---|---|---|
| External environment | Customers | Profile | B2B & system integrators – all<br>Global only – only 1 NZ (s)<br>Local only – 1N2M<br>Government 4N1M<br>B2C - only 1NZ (ns) |
| | | Roles | Referral sales & biz growth (8N5M)<br>Product feedback (6N3M)<br>Partnership (1N1M)<br>Entry barrier(1N) |
| | | How to maintain relationship | Constant communication 4N5M<br>CRM ->Account management 4N2M<br>Overseas offices 1N1M |
| | | Added value | Provide expertise 5N2M->educators1M1N<br>Complementary services or products4N<br>Niche focus 2N1M<br>Constant improvement on products 3N |
| | | Customer reasons | Quality 2N2M<br>Market leader 2N3M<br>Customer intimacy3N1M<br>One-stop solution->solution fit 2M |
| | Economic/ Challenges | Slowdown in National | Companies with greater portion of international sales were minimally affected. The rest were badly affected. However, 2 (1N1M) companies gained greater opportunities as MNC sourced for local vendors. |
| | | Slowdown in Global | Majority faced slowdown in growth and some have problems in debt collection. Only a NZ company has large sales portion in Australia, two M'sia companies focused on local sales were minimally affected. |
| | | Sources of finance *Self-sufficient leads to profit<growth?* | All depends on cash flows or founders' personal savings. Few have bank loans, private equity and angel investors, public funds. One NZ(s) sourced by being acquired and one Malaysia via venture capital, 4M1N opt for IPO. |
| | Industry | Changes*-> growth factors | 1. Different market demand 5N3M<br>2. More innovation 5N4M<br>3. More competitors 1N4M<br>4. Prices change 1N<br>5. Increase rate of change1N<br>6. Workforce change 1N<br>7. Regulatory change 1N<br>8. Market consolidation1M |
| | | Outlook | All have positive outlook that see higher potential of growth, one company concerned aboutcompetitive forces. |
| | | Opportunities | 1. Great market potential5M5N<br>2. New technology/product development3N1M<br>3. New market needs2N4M<br>4. Positive regulatory change1N<br>5. Mergers & acquisition opportunities1M |
| | | Threats/Challenges | 1. Intense competition5N6M<br>2. Negative regulatory change2N1M<br>3. Redundant technology2N1M<br>4. Overwhelmed by market demands 2N<br>5. Market maturity 2M ->slow market change1M<br>6. Negative business confidence1N<br>7. Vertical integrations by clients1M |

| Dimension | Sources | Property/concept | *Resources/activities* |
|---|---|---|---|
| Internal Environment | Human resources capabilities | Recruitment practices | Channels<br>1. Recruitment agencies7N1M<br>2. Self-recruit4N2M<br>3. University4M1N<br>4. Employees referral3N1M<br>*Malaysia has closer link with university*<br>Principle<br>1. Professional qualifications 2N1M<br>2. Multicultural/international recruitment1N1M<br>3. Profiling tool 1N<br>4. IQ test1N<br>5. Police report1N<br>6. Demographic criterions1N |
| | | Remunerations practices | 1. Performance oriented6N3M<br>2. Industry standard2N3M<br>3. Growth related 3N<br>4. Profit sharing 2M<br>5. Higher than industry standard1N |
| | | Staff turnover | 1. Low5N1M<br>2. Industry standard 2N3M<br>3. High1M1N<br>4. Company standard1M |
| | | Why staff stay? | 1. Work environment2N2 M<br>2. Same direction3N1M<br>3. Understand staff needs3N<br>4. Successful and growing business1N<br>5. Company culture1M |
| | | Training & development | 1. Internal6N3M<br>2. Skill oriented2N3M<br>3. External3N1M<br>4. Career oriented1N1M |
| | Marketing capabilities | Importance | Majority companies confessed to limited emphasis in marketing activities. Only 2 NZ (s) and 1 M'sia (s) think it important to promote corporate brand and image via marketing activities. |
| | | Strategies used | 1. Publicity and blog4N2M<br>2. Websites3N3M<br>3. Market research report2N2M<br>4. One-to-one sales2N1M<br>5. Trade shows and conferences2N<br>6. Word of mouth2N |
| | | Perceived company image | 1. Professional4N4M<br>2. Easy to deal with4N2M<br>3. Innovative3M1N<br>4. Quality1M<br>5. Dynamic1N<br>6. Niche provider1N |
| | Research capability | Efforts | 1. Staff involvement7N6M<br>2. Knowledge management6N6M<br>3. Value original ideas6N5 M<br>4. Money spent4N7M<br>5. Organisational emphasis4N3M<br>6. Product development5N3M<br>7. New technology & innovation introduced3N4M<br>8. R & D centre2M<br>9. External involvement1N<br>10. Reward patent1N<br>Only 1 NZ (ns) commented they had very limited R&D efforts |

| Dimension | Sources | Property/concept | *Resources/activities* |
|---|---|---|---|
| Internal Environment | Organisational capabilities | Top management | Who<br>1. Functional directors or managers6N3M<br>2. Board of management2N4M<br>3. Flat hierarchy1M<br><br>Roles in pursuit growth<br>1. Frequent meetings4N2M<br>2. Motivation and direction3N2M<br>3. Review and monitor2N4M<br>4. Agreement across company1N |
| | | Vision | 1 NZ (s) has no vision since establishment till today. 1 M'sia has no vision in the beginning but has set up one currently. The initial visions for companies were generally broad in scope and limited to local markets. The current visions were categorised as below:<br>1. Global oriented 4N3M<br>2. Product expansion3N<br>3. Business philosophies3M<br>4. Local oriented1N<br>5. Value oriented2M<br>How to articulate?<br>1. Daily communication3N 2M<br>2. Induction 1N2M<br>3. Meetings2N<br>4. Live it1N<br>5. Social functions1N<br>6. Involvement in writing up 1M |
| | | Corporate cultures | 1. People driven6N3M<br>2. Relax4N4M<br>3. Innovation driven2N3M<br>4. Business purpose driven2N1M<br>5. Flexibility and agility2M1N<br>6. Value driven1N2M<br>7. Efficiency1M<br>8. Customer driven1N |
| | Resources Dynamism | Resources sharing | 2NZ (s) & 2 NZ (ns) & 1 M'sia (s) have no sharing in resources<br>The rest had shared resources within department, only 1 NZ (ns) is with business unit. |
| | | Resources modifications | 4 NZ (s), 2 NZ (ns) & 1 M'sia (s) & (ns) are involved. They are in the form of product, technology and/or people. |
| | | Resources extension | Only two NZ (ns) are not involved; 3 M'sia (s) & 1 (ns) is involved. They are in the form of people, technology, product and/or customer base. |

| Dimension | Category | Property/concept | Remarks |
|---|---|---|---|
| Strategies | Used strategies* | What? Based on frequencies:<br>High: focus (4N 2M), market anticipation (3N4M), network relationship(3N2M), product offerings (3N3M)<br>Medium: fast response (2N), customer relationship(3N), invest in people (2N,1M), migration to a new business model(1N1M)<br>Low: deliberate in building expertise & market leader position (1N 2M), premium market focus(1N), good plan and vision (2N). | No difference between countries. |
| | | Development: top management, experience and learning, strategic process are main ways. Others include: customer feedback, staff participation or in-house committee or council. | |
| | | Implementation: some issues such as cultures & values, flexibility, authority and good research emerged. Implementation challenges include people, time, funds, technology and customers. | |
| | Current strategies* | High: volume market (3M2N), new product (2M2N)& market (3N2M)<br>Medium: partner sales(2N1M) and niche solutions(2M)<br>Low: brand specialisation (1N), turnaround(2N), customer driver solutions (1M), invest in people(1M) & outsourcing (1M). | |
| | Signal for change | Sales performance, market changes and consumer trends | |
| | Environment impact on strategies | High: Constant review and monitoring, limited funding<br>Low: cannibalisation of market base, purchase decision, business confidence, governmental support, regulations. | |

| | | |
|---|---|---|
| Criterions for sustained growth | 1. Good talent in company (3N2M)<br>2. System to manage growth(3N2M)->good control and monitoring (2N2M)<br>3. Focus in product offering (4N1M)-> right product (1N1M)<br>4. Continuous innovation(3N3M)->fast and agility(1M1N)<br>5. Environment sensitive(3N2M)<br>6. Right and sustained business philosophies (3M1N)->vision and long term plan (2M1N)<br>7. Profitability and fund for growth (3N)<br>8. Good brand and image (1M 1N)<br>9. Good CRM and network (1M1N)<br>10. Luck (1M)<br>11. Strategy (1M) | *Internal capabilities seemed to be dominant, while strategy is least important.* |

## APPENDIX E: Comparative Analysis by Sustained & Non-Sustained High Growth

| Dimension | Category | Sub-category | *Findings/Remarks* |
|---|---|---|---|
| Company Profile | Year Founded | Sustained (S) | *1990-1999 (3)*<br>*2000 & after (5)* |
| | | Non-sustained (NS) | *1990-1999 (4)*<br>*2000 & after (4)* |
| | Number of Founder | Sustained | *1 founder (2)*<br>*2-5 founders (6)* |
| | | Non-sustained | *1 founder (4)*<br>*2-5 founders (4)* |
| | Founders experiences* | S&NS | *Founders in all companies interviewed have relevant work experiences in IT or related industry.* |
| | Founders=CEO* | Non-founder CEO: | *NS(2)*<br>*S (3)* |
| | Subsidiary | S | *Yes:3; No: 5* |
| | | NS | *Yes:3; No: 5* |
| | Overseas ventures* | S | *Yes:6; No:2* |
| | | NS | *Yes:6, No:2* |
| | Number of Employees* | S | *Less than 50: (4)*<br>*50-100: (0)*<br>*101-150: (3)*<br>*More than 150: (1)* |
| | | NS | *Less than 50: (5)*<br>*50-100: (3)*<br>*101-150: (0)*<br>*More than 150: (1)* |
| | Organizational structures | 6. Non-hierachy: one S<br>7. CEO rotation: one S<br>8. Functional: all except no. 1<br>9. Subsidiaries/business unit: two S; one NS<br>10. Geographical: two S, one NS | *Functional structure is dominant, only few companies incorporated subsidiaries and geographical structures* |

| Dimension | Category | Sub-category | *Findings/Remarks* |
|---|---|---|---|
| Performance profile | Growth Measures | • Sales (16)<br>• Profit (11)<br>• Market share (4)<br>• productivity (3)<br>• product performance (2)<br>• number of employees (2)<br>• employee skills (1)<br>• key success factor (1) | *No difference in s & ns, used more than one measures* |
| | Profitable Growth | Majority (10) did not agree that high growth will bring greater profit except 2s & 3ns. Reasons: need to fund the growth, profit can outgrow growth, depends on the cost structures. Two companies in (1s, 1 ns) experienced losses during fast growth periods. | *No difference between s & ns group* |
| | Growth Modes* | Internationalization or market diversification is most popular, followed by acquisitions (2s, 2ns), none involved in business diversification. Change in business ownership: acquisition (2s), IPO (3s, 1ns), venture capital (1ns). | *No difference between S & NS group* |
| | Growth Paths | Growth paths have been steadily upward with some explosive and organic growth during the award periods. Experienced plateau growth during start up or recent financial crisis for 2S, 1NS companies. | *No difference between S & NS group* |
| | Growth Consequences | 4. Finding right people*<br>5. Lost existing market share<br>6. Problem in managing growth: cash flows*, customer expectation, human capital, management structure, market, new technology | *Finding hard to manage finance and people as a result of fast growth; no difference between S&NS group* |
| | Growth Factors* | 13. Product offering (6s, 4ns)<br>14. Market change (5s, 5ns)<br>15. Gaining new customers (1s, 4ns)<br>16. Deliberate strategies (3s)<br>17. Aim to be big (2s, 1ns)<br>18. Business philosophies (1s, 1ns)<br>19. Market leader (1s, 1ns)<br>20. Partnership(2s)<br>21. Patent protection (2s, 1ns)<br>22. Human capital(2s, 1ns)<br>23. Organization cultures (1ns)<br>24. Innovation (1s) | *Majority contributed fast growth to internal capabilities, no difference between S&NS.* |
| | Growth Challenges | 11. People (5s, 5ns)<br>12. Finances (3s,3ns)<br>13. External environment (3s, 2 ns)<br>14. Product development (2s, 1ns)<br>15. Time frame for sales (2s, 1ns)<br>16. Clear future directions (1s, 2ns)<br>17. Management structures (2s)<br>18. System manage growth (1s, 1ns)<br>19. Competition (1ns)<br>20. Customer expectations (1s) | *No difference between S&NS.* |

| Dimension | Sources | Property/concept | *Resources/activities* |
|---|---|---|---|
| External environment | Network | External advisor | *7 companies do not have (4s 3ns).*<br>*Other companies used for advisors for industry research, tax advices, non-board advisory and peer group support.* |
| | | External collaborations* | *Only 1s 2nscompanies have no collaborations.*<br>*Forms of collaborations: new product testing, new technology development, new solutions development, solution partnership for a project, outsourcing work, market alliances, resources sharing.* |
| | | Industry affiliations | *1s & 1ns companies not involved. Majority involved but found limited benefits in the involvement.* |
| | | Supplier/resellers relationship | *Only 1 company in M'sia (ns) has no such relationship. The rest found importance either with contract manufacture, hardware suppliers and product resellers.* |
| | | Knowledge transfer* | *Only 3 companies (1s 2ns) have no knowledge transfer (same as external collaboration). The rest are involved within business partners or within business units.* |
| | Competitors | Profile | *Global player(5s 3ns)*<br>*Numerous (2s 6ns)*<br>*Closer to customers (1s)*<br>*Not specialised(4s 1ns)->not fulfil needs (2s 3ns)*<br>*Follower of technology(2s 1ns)->slow to recognise needs (2s 1ns)*<br>*Clients (1s)* |
| | | Differentiation* | *Niche needs (2s 5ns)*<br>*Technology used(3s 3ns)->company websites (1ns)*<br>*Focus on things good at(2s 1ns)*<br>*IP (2s)*<br>*Distribution model(2s 1ns)*<br>*Strategic partnership (1ns)*<br>*Experience(2ns)*<br>*Customer perceptions(1ns)* |
| | | Dynamics | *Majority keep track of competitors via self-initiatives or customers, only 1s 1 ns companies not keeping track.*<br>*Reactions to competitors were limited as most are technology leaders, not followers.* |
| | Government | *Limited: NZ 1(s) & 3(ns), MSC status tax exemption only: 3 (s), 4 (ns)* | |
| | | *International expansion: 3 NZ (s), 2 M(ns) 1M (s)*<br>*R&D grant:3NZ (s), 1 M (ns)*<br>*Business advice: 2 NZ (s), 1 M(ns)*<br>*Technology policies: 2 M(s), 1 (ns)*<br>*Tax exemptions: all M'sia companies*<br>*Marketing grants: 1 NZ (ns) & 1 M (ns)*<br>*Subsidise intern wages: 1 M (s)*<br>*Only 2 companies in M'sia (1s 1ns)received other than tax exemption benefits.*<br>*Only 1 NZ (s) did not receive any direct benefits from government.* | |
| | Economic/ Challenges | Slowdown in National | *Companies have greater portion of international sales were minimally affected. The rest were badly affected. However, 2 (1s 1ns) companies gained greater opportunities as MNC sourced for local vendors.* |
| | | Slowdown in Global | *Majority faced slowdown in growth and some have problems in debt collection. Only a NZ (s) company has large sales portion in Australia, two M'sia (1s 1ns) companies focused on local sales were minimally affected.* |
| | | Sources of finance<br>*Self-sufficient leads to profit<growth?* | *All depends on cash flows or founders' personal savings. Few have bank loans, private equity and angel investors, public funds. One NZ(s) sourced by being acquired and one Malaysia via venture capital, 3s 2ns opt for IPO.* |

| Dimension | Sources | Property/concept | *Resources/activities* |
|---|---|---|---|
| External environment | Customers | Profile | *B2B & system integrators – all*<br>*Global only – only 1 s*<br>*Local only – 1s 2 ns*<br>*Government 5ns*<br>*B2C - only 1ns* |
| | | Roles | *Referral sales & biz growth (6s 7 ns)*<br>*Product feedback (6s 3ns)*<br>*Partnership (1s 1ns)*<br>*Entry barrier(1ns)* |
| | | How to maintain relationship | *Constant communication 5s 4ns*<br>*CRM ->Account management 2s 4ns*<br>*Overseas offices 1s 1ns* |
| | | Added value | *Provide expertise 5s 2ns->educators 1s 1ns*<br>*Complementary services or products 3s 1ns*<br>*Niche focus 1s 2 ns*<br>*Constant improvement of products 1s 2ns* |
| | | Customer reasons | *Quality 2s 2ns*<br>*Market leader 2s 3ns*<br>*Customer intimacy 1s 3ns*<br>*One-stop solution 1s 1ns->solution fit 1s 1ns* |
| | Industry | Changes*-> growth factors | *9. Different market demand 4s 3ns*<br>*10. More innovation 5s 4ns*<br>*11. More competitors 1s4ns*<br>*12. Prices change 1ns*<br>*13. Increase rate of change1ns*<br>*14. Workforce change 1s 1ns*<br>*15. Regulatory change 1ns*<br>*16. Market consolidation1s* |
| | | Outlook | *All have positive outlook that see higher potential of growth, with one company concern of competitive forces.* |
| | | Opportunities | *6. Great market potential 6s 4ns*<br>*7. New technology/product development 3s 2ns*<br>*8. New market needs 4s 2ns*<br>*9. Positive regulatory change1ns*<br>*10. Mergers & acquisition opportunities1ns* |
| | | Threats/Challenges | *8. Intense competitions5s 6ns*<br>*9. Negative regulatory change1s 2ns*<br>*10. Redundant technology 3s*<br>*11. Overwhelmed market demands 2s*<br>*12. Market maturity 1s 1ns->slow market change1s*<br>*13. Negative business confidence1ns*<br>*14. Vertical integrations by clients1s* |

| Dimension | Sources | Property/concept | *Resources/activities* |
|---|---|---|---|
| Internal Environment | Human resources capabilities | Recruitment practices | <u>Channels</u><br>5. Recruitment agencies 4s 5ns<br>6. Self-recruit 2s 4ns<br>7. University 2s 3ns<br>8. Employees referral3s 1ns<br><u>Principle</u><br>7. Professional qualifications 2s 1ns<br>8. Multicultural/international recruitment2s<br>9. Profiling tool 1s<br>10. IQ test1s<br>11. Police report1s<br>12. Demographic criterions1s |
| | | Remunerations practices | 6. Performance oriented 5s 4ns<br>7. Industry standard 2s 3ns<br>8. Growth related 3s<br>9. Profit sharing 1s 1ns<br>10. Higher than industry standard1s |
| | | Staff turnover | 5. Low 3s 3ns<br>6. Industry standard 3s 2ns<br>7. High1s 1ns<br>8. Company standard1ns |
| | | Why staffs stay? | 6. Work environment2s 2ns<br>7. Same direction 2s 2ns<br>8. Understand staff needs 2s 1ns<br>9. Successful and growing business1s<br>10. Company culture1ns |
| | | Training & development | 5. Internal4s 5ns<br>6. Skill oriented 4s 1ns<br>7. External 3s 1ns<br>8. Career oriented1s 1ns |
| | Marketing capabilities | Importance | Majority companies confessed to limited emphasis on marketing activities. Only 2 NZ (s) and 1 M'sia (s) think is important to promote corporate brand and image via marketing activities. |
| | | Strategies used | 7. Publicity and blog3s 3ns<br>8. Websites 3s 3ns<br>9. Market research report2s 2ns<br>10. One-to-one sales2s 1ns<br>11. Trade shows and conferences2s<br>12. Word of mouth1s 1ns |
| | | Perceived company image | 7. Professional3s 5ns<br>8. Easy to deal with2s 4ns<br>9. Innovative 3s 1ns<br>10. Quality1s<br>11. Dynamic1ns<br>12. Niche provider1ns |
| | Research capability | Efforts | 11. Staff involvement8s 5ns<br>12. Knowledge management7s5ns<br>13. Value original ideas 7s 4ns<br>14. Money spent7s 8ns<br>15. Organisational emphasis4s3ns<br>16. Product development4s 4ns<br>17. New technology & innovation introduced4s 3ns<br>18. R & D centre 1s 1ns<br>19. External involvement1s<br>20. Reward patent1s<br>Only 1 NZ (ns) commented they have very limited R&D efforts |

| Dimension | Sources | Property/concept | *Resources/activities* |
|---|---|---|---|
| Internal Environment | Organisational capabilities | Top management | <u>Who</u><br>4. Functional directors or managers 4s 5ns<br>5. Board of management3s 3ns<br>6. Flat hierarchy1s<br><u>Roles in pursuit growth</u><br>5. Frequent meetings4s 2ns<br>6. Motivation and direction1s 4ns<br>7. Review and monitor 3s 3ns<br>8. Agreement across company1s |
| | | Vision | 1 NZ (s) has no vision since establishment till today. 1 M'sia has no vision in the beginning but has set up one currently. The initial visions for companies were generally broad in scope and limited to local markets. The current visions were categorised as below:<br>6. Global oriented 4s3ns<br>7. Product expansion2s 1ns<br>8. Business philosophies 2s 1ns<br>9. Local oriented 1ns<br>10. Value oriented 2ns<br><u>How to articulate?</u><br>7. Daily communication 1s 4ns<br>8. Induction 1s 3ns<br>9. Meetings 1s 1ns<br>10. Live it1s<br>11. Social functions1s<br>12. Involvement in writing up 1s |
| | | Corporate cultures | 9. People driven6s 3ns<br>10. Relaxed4s 4ns<br>11. Innovation driven 4s 1ns<br>12. Business purpose driven2s 1ns<br>13. Flexibility and agility2s1ns<br>14. Value driven1s 2ns<br>15. Efficiency1ns<br>16. Customer driven1ns |
| | Resources Dynamism | Resources sharing | 2NZ (s) & 2 NZ (ns) & 1 M'sia (s) have no sharing in resources<br>The rest had shared resources within department, only 1 NZ (ns) is with business unit. |
| | | Resources modifications | 4 NZ (s), 2 NZ (ns) & 1 M'sia (s) & (ns) have involved. They are in the form of product, technology or people. |
| | | Resources extension | Only two NZ (ns) are not involved; 3 M'sia (s) & 1 (ns) is involved. They are in the form of people, technology, product and customer base. |

| Dimension | Category | Property/concept | Remarks |
|---|---|---|---|
| Strategies | Used strategies* | What? Based on frequencies:<br>High: focus (2s 3ns), market anticipation (3s 2ns), network relationship(3s 2ns), product offerings (4s 2ns)<br>Medium: fast response (1s 1ns), customer relationship(1s 2ns), invest in people (1n 2ns), migration to a new business model(2s)<br>Low: deliberate in building expertise & market leader position (1s 2ns), premium market focus (1s), good plan and vision (2ns). | No difference between S&NS. |
| | | Development: top management, experience and learning, strategic process are main ways. Others include: customer feedback, staff participation or in-house committee or council. | |
| | | Implementation: some issues such as cultures & values, flexibility, authority and well research emerged. Implementation challenges include people, time, funds, technology and customers. | |
| | Current strategies* | High: volume market (4s); new product (3S 2ns)& market (2s 3ns)<br>Medium: partner sales(2s 1ns) and niche solutions(2ns)<br>Low: brand specialisation (1s), turnaround(1s 1ns), customer driver solutions (1ns), invest in people(1ns) & outsourcing (1s). | |
| | Signal for change | Sales performance, market changes and consumer trends | |
| | Environment impact on strategies | High: Constant review and monitoring, limited funding<br>Low: cannibalisation of market base, purchase decision, business confidence, governmental support, regulations. | |

| | | |
|---|---|---|
| Criterions for sustained growth | 12. Good talent in company (2s 3ns)<br>13. System to manage growth(3s 2ns)->good control and monitoring (3s 1ns)<br>14. Focus in product offering (2s 3ns)-> right product (1s 1ns)<br>15. Continuous innovation(4s 2ns)->fast and agility(1s 1ns)<br>16. Environment sensitive(2s 3ns)<br>17. Right and sustain business philosophies (2s 2ns)->vision and long term plan (1s 2ns)<br>18. Profitability and fund for growth (1s 2ns)<br>19. Good brand and image (1s 1ns)<br>20. Good CRM and network (1s 1ns)<br>21. Luck (1s)<br>22. Strategy (1ns) | *Internal capabilities seemed to be dominant, while strategy is least important.* |

# APPENDIX F: Questionnaire

## Strategies for Growth: Perspectives from the Asia Pacific

### Section One: Company Background

Position of the person who completed this questionnaire: _____

Are you the original founder or cofounder of this business? Please tick.
☐ Yes ☐ No

What is the highest academic qualification of the CEO? Please tick one option.
☐ Less than High School Certificate ☐ High School Certificate ☐ Bachelors Degree
☐ Masters Degree ☐ PhD or other Doctorate ☐ Other, please specify:

How many people founded this business? _____

Number of board positions in <u>other</u> businesses held by the current owner/s of this business? Please tick.
☐ None ☐ One ☐ Two
☐ Three ☐ Four ☐ Five or more

**Start-up information**

In which year was the business established? _____

What was the number of full time employees (2 Part time= 1 Full time) at start up?
_____ (in addition to founder/s)

What was the legal structure of this business at start up? Please tick.
☐ Sole Proprietor ☐ Partnership ☐ Private Company
☐ Public Company ☐ Business Subsidiary ☐ Other, please specify:

How closely related is this business (in terms of product/market) to any previous business owned by or employing the founder/s? Please tick one option.
☐ identical ☐ very closely related ☐ somewhat related
☐ not related

**Current Business information**

What is the current (2012) number of full time employees? _____

How many location/s does the business have? In home country? _____ location/s

Overseas? _____ location/s

What is the current legal structure of this business? Please tick.
☐ Sole Proprietor ☐ Partnership ☐ Private Company
☐ Public Company ☐ Business Subsidiary ☐ Other, please specify:

Number of acquisitions completed by your company in the last 5 years? Please tick one.
☐ None ☐ One ☐ Two
☐ Three ☐ Four ☐ Five or more

Please categorise your sales by customer type and by location:
*a. Type (Total of 100%):*
Other businesses:_____ % Government:_____ % Final consumers:_____ %

*b. Location (Total of 100%):*
Domestic market:_____ % Overseas market:_____ %

Which of the following have been offered by the government to this business? You may tick more than one.

| | | |
|---|---|---|
| ☐ Research grant | ☐ Tax exemptions | ☐ Business advice |
| ☐ Help in international expansion | ☐ Building industry network | ☐ Buy our products/services |
| ☐ Facilities in technology/science park | ☐ None at all | ☐ Other, please specify: |

Which of the following have been offered by external business partners to this business? You may tick more than one.

| | | |
|---|---|---|
| ☐ R&D collaborations | ☐ Knowledge transfer | ☐ Financial advices |
| ☐ Management insights | ☐ Market information | ☐ Market expansion |
| ☐ None at all | ☐ Other, please specify: | |

What have been the main sources of funding for the business? You may tick more than one.

| a. At Start Up | b. Growth since 2008 |
|---|---|
| ☐ Owner's personal savings | ☐ Owner's personal savings |
| ☐ Business cash flow | ☐ Business cash flow |
| ☐ Angel Investors | ☐ Angel Investors |
| ☐ Loans from Family/friends | ☐ Loans from Family/friends |
| ☐ Banks loans | ☐ Banks loans |
| ☐ Public equity | ☐ Public equity |
| ☐ Venture capitalists | ☐ Venture capitalists |
| ☐ Other, please specify:_____ | ☐ Other, please specify:_____ |

Our business's current growth strategy is (please tick one option only)

| | | |
|---|---|---|
| ☐ Slow Growth | ☐ Moderate Growth | ☐ Stay the same size |
| ☐ Substantial Growth | ☐ Other, please specify: | |

**Section Two: Business Performance**

What was the business sales turnover for 2011 financial year? NZD _____

What was the business sales turnover for 2008 financial year? NZD _____

If your business experienced losses in any of these years, please indicate the year(s): _____

What is the estimated sales growth between 2011 and 2012 financial years? _____ %

| Please consider the performance of your business over the previous three years | Much worse----------Much better than your competitors | | | | | | |
|---|---|---|---|---|---|---|---|
| Return on Assets (before interest and tax) | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Return on Equity (after tax) | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Sales Growth | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

***OECD defines High Growth Firm as 'an enterprises with average annualised growth in turnover greater than 20% per annum, over a three year period and with more than 10 employees in the beginning of the observation period'.***

Does your business fit the above definition for the period of 2008-2011 financial years? Please tick.

☐ Yes (go to the Section Three) ☐ No (answer the next question then go to Section Three)

If No, did your business fit the above definition in a different three-year period? Please tick.

☐ Yes (answer the next question then go to Section Three) ☐ No (go to the Section Three)

If Yes, when was the three-year period? _____

**Section Three: Managerial Capabilities**

The following questions ask about the importance of various capabilities influencing your business's growth performance. Please indicate *(circle)* the importance based on the scale from 1(Not important at all) to 7 (Extremely important).

| Capabilities | Not important at all | | | | | | Extremely important |
|---|---|---|---|---|---|---|---|
| Research and development | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Investment in new product development | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Intellectual Property ownership | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

| Capabilities | Not important at all | | | | | | Extremely important |
|---|---|---|---|---|---|---|---|
| Attraction and retention of employees | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Incentives to personnel aligned with company objectives | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Employee selection process | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Adequate training for employees | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Existence of control mechanisms | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Adequate organisational structure | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Existence of a mission and clear objectives | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Efficient and effective task delegation | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Internal process and systemisation improvement | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Existence of strong leadership | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Existence of a culture aligned with objectives | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Search of new growth opportunities | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Customer knowledge | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Current product improvement | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Sales effort | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Strategic planning | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Cash flow management | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Financial reporting management | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Availability of financial capital | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Cost control | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Historical analysis of financial situation | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**Section Four: Factors influencing Growth Performance**

The following questions ask about the factors influencing your business's growth. Please indicate *(circle)* your agreement with the statement based on the scale from 1(strongly disagree) to 7 (strongly agree).

| **External Environment Conditions** | Strongly disagree | | | | | | Strongly agree |
|---|---|---|---|---|---|---|---|
| Government implements policies that successfully developed our innovation capability. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Government provides incentives selectively based on business growth potentials. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| The current government policies did not help in our business growth. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Our firm constantly heeds advice from external networks. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| We always formed business partnerships with other technology firms. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| We constantly look for ways to create value for our customers. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Our new customers are mainly introduced by existing customers. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Our business growth is strongly driven by a few major customers. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Our firm operates in industry where head-to-head rivalry is common. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| The failure rate of firms in our industry is high. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| There are several major competitors with roughly equal competitive positions to us. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Our firm faces similar external environment conditions to other players in the same industry. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| The current external environment outlook will badly affect our business. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| A new challenge/change from the external environment brings new opportunity to our business. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| External environment conditions directly affected our growth performance. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| **Organisational Resources** | Strongly disagree | | | | | | Strongly agree |
| Our business strategies are strongly influenced by the external environment conditions. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| We always share resources with other business units (such as company's subsidiaries). | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| We always acquire additional resources to fulfil new market needs. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Our firm strives to develop new capability at all times. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Our firm is constantly recruiting people. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Our firm's remuneration system is based on individual performance. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Our employees are given training and development opportunities at all times. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Top management is solely responsible for firm's growth directions. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| The top managers of our firm emphasise technological leadership. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Our firm has a strong tendency to be ahead of competitors in introducing novel ideas or products. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| In dealing with competitors, our firm typically follow actions which competitors initiated. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Our abilities to segment and target market help us grow. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| The owner/s is happy with the current size of this business. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| The owner/s seldom looks for new opportunities to grow this business. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| We advertised extensively to reach out to customers. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Our firm emphasises customer relationship management more than other marketing tools to generate growth. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Managers encourage employees to 'think outside of the box'. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| An emphasis on constant innovation is not part of our corporate culture. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Original ideas are highly valued in this firm. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Our firm continuously invests in technology and innovation initiatives. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Our business strategies are influenced by the ever changing and evolving organisational resources. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Changing and evolving organisational resources directly affects our business growth. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| **Strategy** | Strongly disagree | ---------- | | | | | Strongly agree |
| Our firm is continuously expanding to overseas markets for growth. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Domestic market is not important for our business growth. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| There are opportunities to expand the domestic market for our products/services. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| We offer products/services that are unique and distinctly different from our major competitors | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| We only offer products/services that we specialise in. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| We target the same market segment/s since establishment. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| We continuously launch new product/service to capture bigger market share. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| We develop products/services with innovative ideas. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| The product/service that we offer now is totally different from what we offered during the start up. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| We are willing to sacrifice private ownership to generate funds for growth. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Our firm's owner/s favour total autonomy in decision making. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| We always look for opportunities to acquire other firms. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| We are willing to be acquired in order to grow the business. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Acquisitions create more integration issues than growth synergy. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| **Strategy** | Strongly disagree | ---------- | | | | | Strongly agree |
| We rely on one business strategy for growth. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Our business strategy always changes in respond to market changes. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| We adopted several strategies following new business opportunities. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Firm level factors have greater influence than industry level factors in our firm's growth. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| *To what extent does the following hinder your business growth?* | Not at all | ---------- | | | | | To a large extent |
| Insufficient profitability | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Lack of skilled technical expertise | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Lack of managerial talent | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Difficulties in getting finance | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Lack of marketing expertise | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Difficult to meet customers' expectations | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Lack of suitable system to manage growth | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Slow product development | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Uncertainty in the external environment | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Low personal motivation for growth | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Other, please specify _____ | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Thank you very much for taking part in this research. Please check that you have completed all questions before sending the completed questionnaire in the enclosed pre-paid envelope. **Please be assured that your responses will be treated with the strictest confidence at all times.**

If you wish to receive a summary of this survey finding, please attach your business card or provide your email address below:

_____

## APPENDIX G: Ethics Approval

Ref: HEC 2010/110

16 August 2010

Poh Yen Ng
Department of Management
UNIVERSITY OF CANTERBURY

Dear Poh Yen

The Human Ethics Committee advises that your research proposal "Developing strategies for sustainable fast growth: perspectives from the Asia Pacific" has been considered and approved.

Please note that this approval is subject to the incorporation of the amendments you have provided in your email of 9 August 2010.

Best wishes for your project.

Yours sincerely

Dr Michael Grimshaw
***Chair, Human Ethics Committe***

HUMAN ETHICS COMMITTEE

Secretary, Lynda Griffioen
Email: human-ethics@canterbury.ac.nz

Ref: HEC 2011/139

21 December 2011

Poh Yen Ng
Department of Management
UNIVERSITY OF CANTERBURY

Dear Poh Yen

The Human Ethics Committee advises that your research proposal "Developing strategies for sustainable fast growth: perspectives from the Asis Pacific" has been considered and approved.

Please note that this approval is subject to the incorporation of the amendments you have provided in your email of 21 December 2011.

Best wishes for your project.

Yours sincerely

Michael Grimshaw
***Chair***
***University of Canterbury Human Ethics Committee***

## APPENDIX H: Case Synopsis

**Company: Possibilities Software Sdn Bhd (Malaysia)**

**Deloitte rank and growth rate: 237, 240.36% (2008); 473, 83.63% (2009)**

**Interviewed: Managing Director (founder), December 2010**

Possibilities Software was founded by an experienced system specialist who came back from Australia in year 1999. It is a boutique software and outsourcing house for asset managers such as unit trusts, life offices, custodians, trustees, bank wealth management units and asset managers. The company started by implementing a system solution for a local bank. From there, they found their market advantage and began serving many financial institutions. Possibilities Software has weathered many industry challenges especially during the period when most of the local banks were consolidating or merging with one another. They have successfully achieved high-growth performance by generating revenue from solution implementation, monthly license fees and maintenance, which has allowed them to invest back to research activities. Currently, they are developing an outsourcing solution that allows data to be shared among the clients to improve their productivity. Though they did not secure any new business in year 2010, they still managed to generate sufficient revenue from monthly license and maintenance fees from previous implementation sites. Possibilities Software guarantees solutions by offering full money back to their customers if the implementation fails. Though the company has limited presence in overseas markets, they are looking forward to expanding internationally.

**Company: Creative Sign Sdn Bhd (Malaysia)**

**Deloitte rank and growth rate: 193, 281.05% (2008); 96, 373.49% (2009)**

**Interviewed: Chief Executive Officer (founder), December 2010**

Creative Sign was founded in year 2004 by a new graduate with an American computer science degree who is also the current Chief Executive Officer. He started the business by securing finance from a business investor. Creative Sign initially intended to provide digital signage advertising solutions but this did not work well. After few years of being in the market, the company decided to remodel the business and become purely a service provider for digital signage solutions. They started selling their solutions to banks, telecommunication companies, advertising agencies and shopping malls. Many of these companies approached Creative Sign to set up digital signage in their premises. Through the interactive screens,

these companies promote their products/services or sell advertisement slots to related business partners. The concept was very popular and the business is growing tremendously in this country. Creative Sign provides customized digital and interactive media solutions such as digital signage, 2D/3D content creation, interactive projections, multi-touch tables and directional sound speakers. As well as earning from the initial set up solution, the company also generates revenue from long-term maintenance on the content design and hardware support. Creative Sign has strong ties with many hardware manufacturers such as Samsung, Philips and LG. They have used this relationship to provide better customer support to their clients, which the company is proud of. Currently, Creative Sign is negotiating a partnership with a Singaporean company to expand its business in this neighbouring market. The company is also looking forward to expanding its business with advertising agencies by complementing traditional advertisement mediums with digital solutions.

**Company: B2B System Bhd (Malaysia)**

**Deloitte rank and growth rate: 132, 293.14%; 164, 310.84% (2007); 186, 295.26% (2008)**

**Interviewed: Executive Director (founder), January 2011**

B2B System was founded by five IT specialists who were working together in a multinational corporation in Kuala Lumpur. They decided to start this business when they recognised opportunities from the Internet booms. They started the business by providing business solutions to a stock-broking company. From there, they have been doing software development and solution packages for financial institutions. B2B has been well-recognised as a credible technology enabler of online share trading. They have formed strategic partnerships with major telecommunication companies and stock securities in Malaysia and Singapore. Since its inception in year 2000, the company has achieved remarkable growth and enjoyed first-mover advantages over many e-business solutions for the financial industry. The company was converted to a public company in year 2004. The availability of public funding has allowed the B2B to set up a wholly-owned subsidiary which focuses on research and development and intellectual property creation. In addition, joint ventures and subsidiaries were also established in Dubai, Vietnam, Singapore and Indonesia to widen their presence in the global market. B2B attributed their growth to market and technology opportunities arising in the region as well as their innovation ability to fulfil the needs. They have been offered a government grant for new product development.

**Company: Mobile Pack Bhd (Malaysia)**

**Deloitte rank and growth rate: 49, 666.28% (2006); 99, 447.52% (2007)**

**Interviewed: Corporate Communication Manager, January 2011**

The founder of Mobile Pack started this company with some partners in Silicon Valley when he was a new graduate in year 1999. However, the dot.com bust has affected the team and the operation was moved back to Malaysia in year 2001. Nevertheless, the research team in the United States is still maintained as the company's research arm. After years of providing mobile solutions to telecommunication companies, Mobile Pack has emerged as a fully integrated mobile broadband player. They currently anchor firmly on the two synergistic business pillars: 'Solutions' and '4G Network Operator'. This company was listed on the MESDAQ market of the Malaysian bourse where the Company's market capitalisation peaked to RM 2.7 billion. Mobile Pack transitioned to the Main Board two years later. The company has grown its business with operations in nine countries: the USA, Malaysia, Singapore, Taiwan, China, Australia, Bahrain, Thailand and Hong Kong. Mobile Pack currently employs over 1,000 staff. They are considered the Asia's No.1 connection management software solution provider. In addition, this company is also the first in the Asia, and among the pioneers in the world, to deploy 802.16e 2.3GHz WiMAX that allows mobile data to be shared anywhere in any device. Mobile Pack aims to offer 4G services to 50% population coverage by the end of 2012.

**Company: Innovation Centric Sdn Bhd (Malaysia)**

**Deloitte rank and growth rate: 67, 520.37% (2006)**

**Interviewed: Chief Executive Officer (founder), December 2010**

Innovation Centric was established in year 2005 by two engineers who were colleagues in a multi-national corporation. The company provides software-based mobility platforms that enable businesses to extend their applications and information to any wireless device. Innovation Centric experienced tremendously growth when they started offering mobile banking solutions to major banks in Malaysia. They are also developing new solutions such as mobile messaging and mobile networking solutions to the wider community. Innovation Centric consider their ability to fulfil customer needs and focus on their expert solutions has greatly helped their expansion. Though they face stiff competition from numerous similar solution providers, they managed to generate satisfactory revenue from the growth of the mobile solution market. Currently, they are working with partners in Singapore and Indonesia to market their solutions. There are plans to go into Vietnam and Thailand as well. This

company is financially self-sufficient as they do not receive any funding from government, investors or the public.

**Company: Secure Boundary Sdn Bhd (Malaysia)**

**Deloitte rank and growth rate: 328, 162.23% (2007)**

**Interviewed: Chief Executive Officer (founder), December 2010**

Secure Boundary was founded by two friends studying in the same university in the United Kingdom. The business started in year 2000 with the ambition to offer information security solutions to a range of businesses as well as to government and education institutions. Secure Boundary has expertise in the entire computer and network security spectrum and has the ability and know-how to address all the security threats, fraud and malicious activities. Secure Boundary has been engaged and associated with the design, setup and maintenance of security infrastructure belonging to some of the largest and most complex security initiatives and projects in the region. They attribute their growth performance to the reliance on the Internet, which creates high demand for information security. Besides, their strong clientele also opens up many business opportunities. They have more than 400 resellers in the industry offering 24/7 round the clock information security services to their customers. To date, the company has extended its business to Brunei, Thailand, Singapore and Hong Kong.

**Company: Bank Link Bhd (Malaysia)**

**Deloitte rank and growth rate: 418, 122.47% (2006)**

**Interviewed: Chief Executive Officer, January 2011**

Bank Link was founded in year 1994 by three Malaysians who currently hold key positions in the company. They were working in the banking industry and decided to set up a software house to develop solutions for banks. Since then, the company has been providing application suites of modules to both conventional and Islamic banking houses. They have several in-house suites of products that cater for the all major retail, wholesale and investment banking needs of financial institutions. The company also takes pride in their solution that covers Islamic elements and complies with Shari'ah requirements. They are among the pioneers in offering Islamic banking solutions in Malaysia. They have put huge investment into research and development activities. Bank Link became a public listed company in year 2005. The company owns six subsidiaries with two located in Indonesia. Apart from that, Bank Link has also successfully sold its solutions to banks in many Middle-East countries.

**Company: Data Media Sdn Bhd (Malaysia)**

**Deloitte rank and growth rate: 456, 109.06% (2006)**

**Interviewed: Chief Executive Officer (founder), January 2011**

Data Media was founded in year 1997 and is the largest media monitoring and evaluation agency in Malaysia and South East Asia. This company was founded by three partners who were in the advertising and media industry. The initial funding was from their personal savings. Data Media is the first company to offer media library services in the Malaysia market. This service is important to businesses such as advertising agencies, public relations firms, government departments and higher education institutions. As it was started during the Internet boom, Data Media managed to reform the media monitoring industry by applying the latest technology ahead of other traditional global players. The advance methodology enabled the company to have a market leadership position in the region. Success in Malaysia has led Data Media's progressive expansion to neighbouring markets like Singapore, Thailand, the Philippines, Vietnam and Indonesia. During the expansion they received funding from angel investors in Malaysia and Taiwan. The company also went through restructuring as a result of growth. It set up a subsidiary that owns the overseas operations. Due to international expansion it has also built several strategic alliances with regional media players. It has a dedicated research and development team to enhance its technology capabilities. Data Media also received tax credit and marketing grants from the government. To manage the growth in size and number of employees, this company has a 'One Heart' philosophy emphasising its organisational culture. In recent years Data Media started eyeing the North Asian market with mergers and acquisition efforts. It is opting for public listing to fund its next phase of organic expansion.

**Company: Future Screen Ltd (New Zealand)**

**Deloitte rank and report growth rate: 223, 206.85% (2006); 79, 567.44% (2007); 138, 378.17% (2008); 27, 828.84% (2009)**

**Interviewed: Chief Executive Officer, September 2010**

Future Screen is a New Zealand based touch screen manufacturer founded in year 2001. The company started with the vision of an aspiring scientist (currently the Chief Technology Officer) and funding from two angel investors. The current CEO joined Future Screen two years after its inception. With industry experience gained from previous employment with IBM and private equity firms, he has pushed the company from a research-oriented

technology company to a growth-oriented international enterprise. Future Screen attributes the growth to its ability to understand customers and gain new customers, changes in the market and environment, patents awarded for their intellectual property and betting on the right opportunities. Their miniature optical imaging touch screen technology was initially used in point of sale, ticketing and gaming. The growth of touch screen applications in desktop computers opened a new volume market for the company. This new-found market fuelled the growth by bringing many new customers such as HP, Sony, Dell and NEC, from the desktop computer industry. As it was first-of-its-kind technology in New Zealand, Future Screen received strong financial support from TechNZ. They have received two significant grants, for a high-risk research and development project to miniaturise their optical imaging touch screen technology, and to employ a manufacturing specialist to help realise their first global manufacturer contracts with Hewlett Packard. Since then, the company has grown progressively with at least 135 employees worldwide and six overseas offices. Its great potential attracted a multibillion-dollar Canadian technology company's takeover in April 2010. Though it was taken over by a foreign technology giant, Future Screen has retained its entire business operation in Auckland.

**Company: Alpha Pulse Ltd (New Zealand)**

**Deloitte rank and growth rate: 258, 184.97% (2006); 168, 304.02% (2007); 334, 172.92% (2008)**

**Interviewed: Chief Executive Officer, September 2010**

Alpha Pulse was founded in year 1999 and is the largest online direct response agency in New Zealand. This company was founded by two partners, with private equity from an investment company, to capture the opportunities available from the Internet boom. Alpha Pulse was originally a website development company but soon changed its focus to search optimisation services. Alpha Pulse is the first company to offer Google search optimisation and search engine optimisation services in the New Zealand market. The success of its New Zealand operations led Alpha Pulse's expansion to Australia. The international expansion was challenging as they faced constraints in the resources needed to manage both New Zealand and Australia markets. As a result, the company paid a high price by losing its dominant position in New Zealand. Two years later, however, the sacrifices led to explosive growth in the Australian market. As well as strengthening its presence in the Australia market, Alpha Pulse has also started to acquire software companies. These acquisitions allow the company to enjoy extraordinary growth in revenue, profit and staff strength. Most of the

acquired companies provide web-related services which complement Alpha Pulse's search and perform business. With its high potentials and abilities in Australian market, it soon attracted foreign acquisition. Four years ago, this company was taken over by Q Group which is listed in the Australian Stock Exchange. It has become a subsidiary to Q Group with unchanged independent operations based in New Zealand. This takeover allowed Alpha Pulse to enjoy strong network capabilities with subsidiaries in the group. Currently, it has offices in Melbourne, Sydney and Perth to serve the fast growing market. Alpha Pulse's business model is based on the performance network, where the advertisers only pay for the advertisements if someone clicks on it. This is an advertising method favoured by many advertisers. This business model allows Alpha Pulse to obtain organic growth in both revenue and profit. During the growth process, the company decided to switch focus from the New Zealand market to Australia and was involved in several acquisition activities. Hence, the Alpha Pulse case shows that risk-taking decisions are needed in some situations in order to capture higher growth in future.

**Company: Mega Connection Ltd (New Zealand)**

**Deloitte rank and growth rate: 222, 207.81% (2006); 91, 497.61% (2007); 410, 139.63% (2008)**

**Interviewed: Chief Executive Officer, October 2010**

Mega Connection was founded by two co-workers who were working together in an Internet-based company in year 2000. They recognised the emergence of broadband in New Zealand and started by supplying remote network management services to small businesses. Both are still involving in the business but are focusing on business development and research innovation areas. Mega Connection has developed and patented a network security management communication technology that has been used in many applications. The company achieved high-growth performance when they managed to supply secure network services to Telecom New Zealand and the Ministry of Health. Their major customers are telecommunication companies that require broadband network management systems. Mega Connection has expanded its operations to Australia, the United Kingdom, the Middle-East and South Africa. They are currently investing a new solution to serve the payment card industry security standard, which they expect a great return from. They have made big investments in research and development. The New Zealand Government has also awarded a research grant for this development. Due to the nature of its business, Mega Connection has

very stringent staff employment processes. Finding and retaining good talent has been a great challenge for them.

**Company: The Race Ltd (New Zealand)**

**Deloitte rank and growth rate: 436, 113.98% (2006); 36, 1,120.58% (2007)**

**Interviewed: Chief Executive Officer (founder), October 2010**

The Race is a mobile marketing company located in Wellington. It was established in year 1999 by three founders. All three founders are still with the organisation and rotate the position of Chief Executive Officer. None of the founders has any technical background in Internet and mobile technology. They depend on recruiting technical personnel for program development. The Race was initially a web development company. Later the company ventured into mobile advertising when they saw the great opportunities in the mobile market. Currently the company is trying to change its business model from a service-oriented company to a product oriented company. They are building up a new platform which can be easily replicated in other geographical areas and sold under licence to overseas partners. During its high-growth periods, The Race ventured into overseas markets by setting up operations in Australia, Brazil and the United States. The growth was impressive but the resource requirements from the overseas expansion eventually dried up the company's financial reserves. Therefore, The Race decided to focus on building internal capabilities and has sold off their operations in Brazil to their Dutch partners. However, they are still keeping their presence in the United States and Australia markets. The company is hopeful of its international expansion and is investing in suitable technology platforms to sustain the aggressive growth in mobile marketing business.

**Company: Rise Tech Ltd (New Zealand)**

**Deloitte rank and growth rate: 285, 108% (2004)**

**Interviewed: Director (founder), October 2010**

Rise Tech was founded by a new graduate from Victoria University of Wellington with his business mentor in year 1992. Both were involved in the technology industry for many years before setting up this business. They recognised the opportunities of the B2C business by selling computer peripherals online. They started by supplying and selling in the North Island but their business has grown extensively and now covers the South Island and the Pacific Islands as well. Rise Tech has formed strategic partnerships with many well-known brands of technology product. As well as selling to consumers they have managed to secure large-

scale procurement contracts from government and local authorities. Apart from selling computer hardware through their website, Rise Tech also provides software consultation and development if their customers required it. Due to the increasing popularity of online business, Rise Tech is facing great challenges from competitors who are competing on price. However, the company is differentiating itself by offering premium products with quality service. They attribute their business growth to their fast-response customer service and interactive website.

**Company: Inflame Ltd (New Zealand)**

**Deloitte rank and growth rate: 404, 100.16% (2009)**

**Interviewed: Chief Executive Officer (founder), November 2010**

Inflame was founded by five members who were working in the same company. It was set up in Wellington in the year 2001, however two of the original members left the company a few years ago. Inflame has become a world leader in online development, mobile solutions, unified communications and experience design consultancy. They offer a full suite of services, from strategic consulting through to design, development, testing, integration, hosting support and maintenance services. Their customers range from government agencies and telecommunications businesses to the education industry. Inflame has over 80 staff worldwide, with offices in Wellington, Auckland and Seattle. Inflame's strategic partnership with Microsoft has allowed it to expand to other regions. This partnership opened up many business opportunities and strengthened their growth performance. Currently they are planning to establish another office in Australia. This could help Inflame to have a stronger presence and to capture the growth potential in this market.

**Company: Green Cue Ltd (New Zealand)**

**Deloitte rank and growth rate: 194, 217.77% (2009)**

**Interviewed: Director (founder), March 2011**

Green Cue was set up by two founders in year 2003. They found out that local government authorities were having problem dealing with their compliance and there was no software application to manage this. Both were motivated to offer an environmental and resource management solution. With their technical background and industry experience, the business has grown substantially over the years. Most of their customers are from the public sector which includes local councils and government agencies. They also sell their solutions to large corporate entities in the mining and construction industries. Green Cue's product suite

encourages environmentally sustainable business practices and corporate environmental responsibility through systematic statutory risk management. Due to the high development cost, the company has only in recent years managed to generate sufficient profit. Green Cue does not have overseas subsidiaries or offices but they a have strong customer base in Australia. Nevertheless, they have the confidence to offer their product in the English-speaking international market but need to be cautious about expansion plans.. This is because the solution needs to be custom-made for each different country's compliance requirements.

**Company: NZ Link Ltd (New Zealand)**

**Deloitte rank and growth rate: 342, 117.67% (2009)**

**Interviewed: Chief Executive Officer, March 2011**

NZ Link was founded by two engineers working in an electronics company. They saw an opportunity in the vehicle industry and decided to start this company in 1998. Since then, NZ Link has designed and developed intelligent transportation solutions for mass transit agencies world-wide. They also assist their customers in the management and operation of transit fleets and enable the real-time tracking and monitoring of vehicles. NZ Link has since enabled their solution to work with mobile and web applications to deliver highly accurate real-time information. They do not have any close competitors in New Zealand but do face competition from overseas providers in this country. NZ Link had an unsuccessful venture in the United Kingdom in year 2009 when their solution did not get much acceptance in that market. However, they managed to penetrate into the United States. Their sales in the United States have contributed greatly to their growth performance. Currently they have an office in the United States to serve their customers who are mainly from the public sector. They have also appointed consultants to deliver solutions in Australia.

## APPENDIX I: Analysis Based on All Responses, Aggregated High-Growth and Non-High-Growth Firms of New Zealand and Malaysia

This appendix provides a brief description of the statistical analysis based on two sets of data. The first data compiled all the responses received from the survey questionnaires, regardless of countries and growth groups. Thus, a total of of 163 (N=163) responses was used in the analysis. The second data set comes from all the high-growth firms and non-high-growth firms of both countries. In this case, a total of 80 (N=80) high-growth firms from both Malaysia and New Zealand was used to represent the high-growth groups, while a total of 83 (N=83) combining all non-high-growth firms in both countries was used to represent the non-high-growth group. The discussion in this appendix is divided into two sections.

The first section explains the statistical analysis results of all responses used in this study as a single group. As such, the reliability test, regression analysis and path modelling takes into account the whole sample. Country and growth group effects are not considered in this analysis. The subsequent section explains the response results based on their growth categories. In this case the effect of the difference in countries is not examined. In order to differentiate the high-growth group from the non-high-growth group, Chi-square test and Fisher's exact test were used on the firms' background data. Based on the results found in regression analysis, path models are developed according to the different growth categories. Comparison was made between these two different growth categories. However, it is important to note that these analyses do not explain the differences between countries. The results assume that high-growth and non-high-growth firms have similar profiles in New Zealand and Malaysia.. Nevertheless, the results outlined in Section 5.3 in this thesis reveal some differences between the technology-based firms in the two countries.

The discussion aims to offer alternative analyses to the conceptual model developed in Figure 4.1 of the thesis. Analysing the samples based on different categories confirmed the relevance of the growth elements identified from the case studies. The following explanation will focus only on the differences found between the results explained in Chapter 5 and the alternative analysis groups.

**Analysis on All Responses**

Following statistical procedures similar to those explained in Section 5.4, Cronbach's alpha reliability results are comparable to the findings in Section 5.4 where all factors (except niche focus and acquisition for growth) range from 0.90 to 0.54, thus fulfilling Nunnally's (1967) recommendation. The same factors were used in the subsequent regression and path analysis. The result is shown in Table 1 below:

**Table 1 Cronbach's Alpha Reliability for Variables (N=163)**

| Variables | Cronbach's Alpha |
|---|---|
| ***Performance*** | 0.83 |
| | |
| ***Strategy*** | |
| Product Innovation | 0.78 |
| Market Expansion | 0.60 |
| Remaining-in-private-ownership | 0.73 |
| Niche Focus* | 0.40 |
| Acquisitions for growth* | 0.30 |
| Strategy Flexibility | 0.65 |
| | |
| ***Resources-Capabilities*** | |
| Government Policies | 0.88 |
| Human Resources | 0.71 |
| External Network | 0.60 |
| Resources Dynamism | 0.70 |
| Innovation Capability | 0.84 |
| Human Capability | 0.90 |
| Organisational Capability | 0.83 |
| Marketing Capability | 0.71 |
| Financial Capability | 0.88 |
| | |
| ***Challenges*** | |
| External Environment Effects | 0.74 |
| Industry Competition | 0.54 |
| Financial Barriers | 0.65 |
| Human Barriers | 0.66 |

**factor not included in subsequent analysis*

Regression analyses were conducted based on the hypotheses outlined in Chapter 4. Based on the results in Table 2, it was found that government policies, human resources and external relationships/networks have significant relationships to resources dynamism. In other words, all these sources make vital contributions to the abilities of technology-based firms to use resources dynamically for better performance. As such, Hypotheses 1a, 1b and 1c are supported in this case. Compared with the results found in Section 5.6 of the thesis, where only human resources were found to contribute to resources dynamism, combining all the responses appeared to strengthen the relationships. The reason could be that the total number

of responses used in this alternative analysis (N=163) is much greater than the number used in Section 5.6, where separate regression analyses were run on New Zealand (N=110) and Malaysia (N=53).

**Table 2 Resources Dynamism Predictors**

| | ***Resources Dynamism*** | |
|---|---|---|
| | ***Standardised β*** | ***sig*** |
| Government Policies | 0.17 | 0.01* |
| Human Resources | 0.37 | 0.00** |
| External Network | 0.15 | 0.03* |
| $R^2$ | 0.27 | |
| *Adjusted* $R^2$ | 0.26 | |

**p<0.05; ** p<0.01*

Similar effects were found in the relationship between resources and capabilities. The results shown in Table 3 reveal that the statistical results for all responses were very much the same as those found in the New Zealand samples as shown in Table 5-8 in Section 5.6. This is not surprising as New Zealand had a much larger sample than Malaysia and therefore the effect would be greater when both data sets were combined.

**Table 3 Effects of Resources to Capabilities**

| | ***Standardised β*** | ***sig*** |
|---|---|---|
| ***Innovation capability*** | | |
| Government Policies | 0.38 | 0.00** |
| Human Resources | 0.04 | 0.60 |
| Resources Dynamism | 0.16 | 0.33 |
| External Relationships/Networks | 0.07 | 0.05 |
| $R^2$ | 0.25 | |
| *Adjusted* $R^2$ | 0.23 | |
| ***Human Capability*** | | |
| Government Policies | 0.11 | 0.07 |
| Human Resources | 0.50 | 0.00** |
| Resources Dynamism | 0.20 | 0.00** |
| External Relationships/Networks | 0.09 | 0.13 |
| $R^2$ | 0.48 | |
| *Adjusted* $R^2$ | 0.47 | |
| ***Marketing Capability*** | | |
| Government Policies | 0.10 | 0.17 |
| Human Resources | 0.20 | 0.01* |
| Resources Dynamism | 0.18 | 0.02* |
| External Relationships/Networks | 0.19 | 0.01* |
| $R^2$ | 0.22 | |
| *Adjusted* $R^2$ | 0.21 | |
| ***Organisational Capability*** | | |
| Government Policies | 0.11 | 0.11 |
| Human Resources | 0.35 | 0.00** |
| Resources Dynamism | 0.10 | 0.17 |
| External Relationships/Networks | 0.18 | 0.01* |
| $R^2$ | 0.30 | |
| *Adjusted R2* | 0.28 | |
| ***Financial Capability*** | | |

| | | |
|---|---|---|
| Government Policies | 0.17 | 0.02* |
| Human Resources | 0.13 | 0.12 |
| Resources Dynamism | 0.22 | 0.00** |
| External Relationships/Networks | 0.13 | 0.08 |
| $R^2$ | 0.21 | |
| *Adjusted* $R^2$ | 0.20 | |

**p<0.05; ** p<0.001*

The summary for Hypothesis 2 is shown in Table 4. Compared with Table 5-9 in Section 5.6, the hypothesis results are similar to those in the New Zealand context, except for the relationship of government policies to human capability and financial capability. Nevertheless, the results confirm only partial support of Hypothesis 2 as they did in Chapter 5.

**Table 4 Summary of Hypothesis Two**

| ***Resource/ Capability*** | ***Innovation*** | ***Human*** | ***Marketing*** | ***Organisational*** | ***Financial*** |
|---|---|---|---|---|---|
| 2a (GP) | ✓ | x | x | x | ✓ |
| 2b (HR) | x | ✓ | ✓ | ✓ | x |
| 2c (RD) | x | ✓ | ✓ | x | ✓ |
| 2d (EN) | x | x | ✓ | ✓ | x |

Table 5 reveals the relationship between capabilities and strategies. Compared with Table 5-10 in Section 5.7, the results are again more comparable to the New Zealand results.

**Table 5 Effects of Capabilities to Strategies**

| | ***Standardised β*** | ***sig*** |
|---|---|---|
| ***Market Expansion Strategy*** | | |
| Innovation capability | 0.44 | 0.00** |
| Human Capability | 0.25 | 0.00** |
| Organisational Capability | 0.06 | 0.51 |
| Marketing Capability | 0.08 | 0.36 |
| Financial Capability | 0.08 | 0.39 |
| $R^2$ | 0.27 | |
| *Adjusted* $R^2$ | 0.25 | |
| ***Product Innovation Strategy*** | | |
| Innovation Capability | 0.40 | 0.00** |
| Human Capability | 0.35 | 0.00** |
| Organisational Capability | 0.11 | 0.18 |
| Marketing Capability | 0.16 | 0.06 |
| Financial Capability | 0.15 | 0.07 |
| $R^2$ | 0.43 | |
| *Adjusted* $R^2$ | 0.41 | |
| **Remaining-in-private-ownership** | | |
| Innovation Capability | -0.23 | 0.00** |
| Human Capability | -0.03 | 0.74 |
| Organisational Capability | 0.01 | 0.91 |
| Marketing Capability | -0.11 | 0.29 |
| Financial Capability | -0.05 | 0.61 |
| $R^2$ | 0.10 | |
| *Adjusted* $R^2$ | 0.07 | |
| **Strategy Flexibility** | | |

| | | |
|---|---|---|
| Innovation Capability | 0.05 | 0.51 |
| Human Capability | 0.34 | 0.00** |
| Organisational Capability | -0.12 | 0.26 |
| Marketing Capability | 0.13 | 0.18 |
| Financial Capability | 0.08 | 0.42 |
| $R^2$ | 0.17 | |
| *Adjusted* $R^2$ | 0.15 | |

**p<0.05; ** p<0.001*

However, there are two exceptions. First, the relationship between remaining-in-private-ownership and innovation capability was not significant in the New Zealand samples in the previous analysis. However, the relationship was significant in the Malaysia samples according to Table 5-10. It was found to be significant again when both samples were combined. Secondly, marketing capability was found to have a significant relationship ($p<0.05$) to product innovation strategy when the New Zealand samples were used. The effect reduced to non-significant when the two were combined, which may be due to the responses in the Malaysian samples. The summary of hypotheses is shown in Table 6.

**Table 6 Summary of Hypothesis Three (a), Five, Seven (a) and Nine (a)**

| ***Capability/Strategy*** | ***Market Expansion*** | ***Product Innovation*** | ***Remain Private ownership*** | ***Strategy Flexibility*** |
|---|---|---|---|---|
| Innovation Capability | ✓ | ✓ | ✓ | x |
| Human Capability | ✓ | ✓ | x | ✓ |
| Organisational Capability | x | x | x | x |
| Marketing Capability | x | x | x | x |
| Financial Capability | x | x | x | x |

**Table 7 Summary of Performance Model**

| | ***Standardised β*** | ***Sig*** |
|---|---|---|
| Product Innovation Strategy(H4) | 0.35 | 0.00** |
| Market Expansion Strategy (H6) | 0.13 | 0.08 |
| Remaining-in-private-Ownership (H8) | 0.18 | 0.02* |
| Strategy Flexibility (H9) | 0.04 | 0.63 |
| Financial Barriers (H12) | -0.16 | 0.04* |
| Human Resources Barriers (H11) | -0.14 | 0.04* |
| Industry Competition (H10a) | -0.05 | 0.42 |
| External Effect(H10b) | -0.22 | 0.00** |
| $R^2$ | 0.31 | |
| *Adjusted* $R^2$ | 0.27 | |

**p<0.05; ** p<0.001*

Table 7 shows the results of regression analysis for the performance model. It is again similar to the New Zealand model with the exception that human capital barriers were found to have a significant relationship to performance in this case. It does show a greater impact on the

performance model with a larger sample size. The hypotheses results are summarised in Table 8. By using the regression analysis results, the path model is tested by using a PLS-graph. Similar statistical procedures were conducted following the criterion of the PLS-graph. The result is shown in Figure 1.

**Table 8 Summary of Hypotheses**

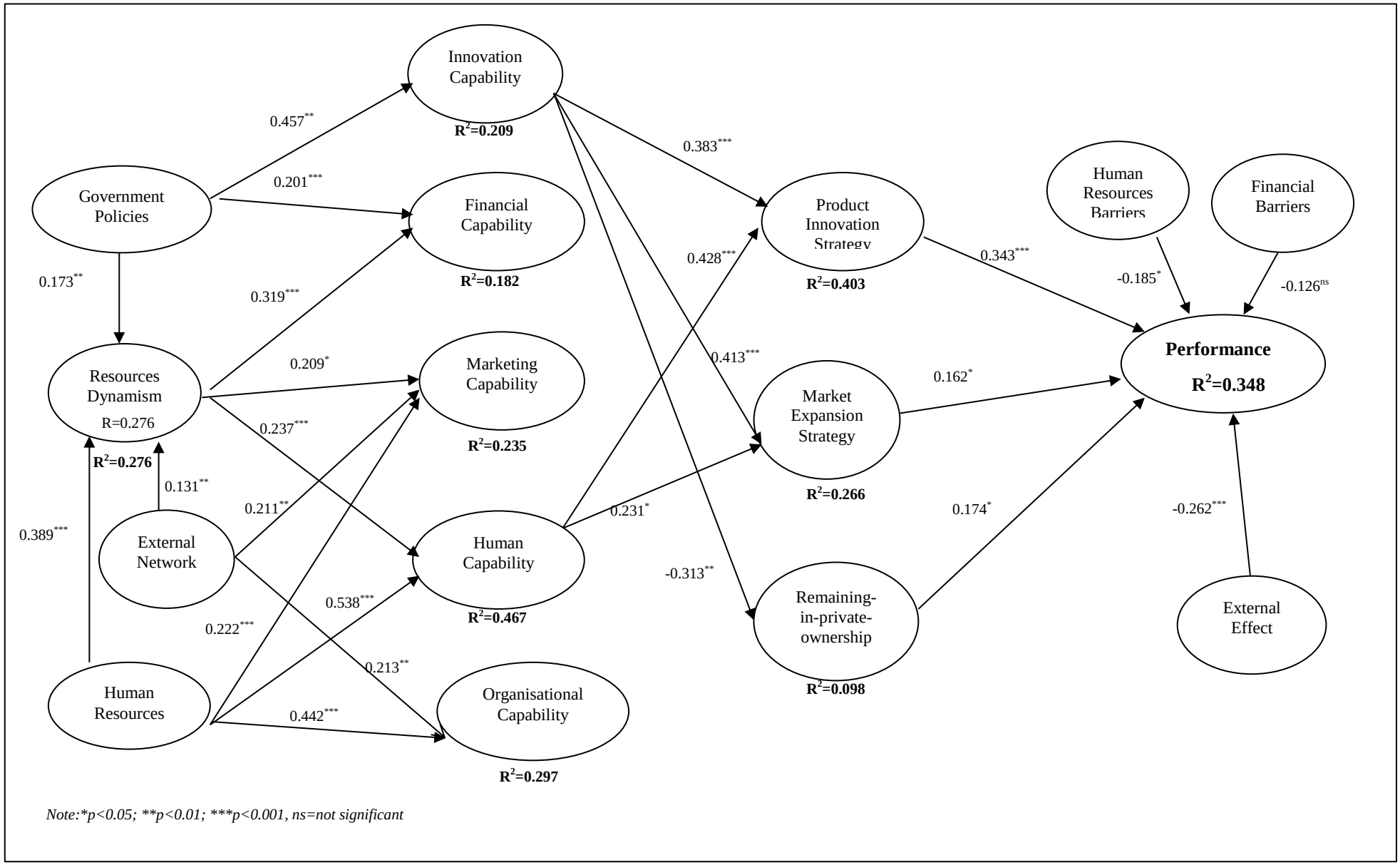
| | ***Hypothesis*** | |
|---|---|---|
| $H_{1a}$ | Government policies influence technology-based firms' ability to use resources dynamically (resources dynamism). | ✓ |
| $H_{1b}$ | Human resources influence technology-based firms' ability to use resources dynamically (resources dynamism). | ✓ |
| $H_{1c}$ | External relationships/networks influence technology-based firms' ability to use resources dynamically (resources dynamism). | ✓ |
| $H_{2a}$ | Government policies are related positively to the capabilities of technology-based firms | $✓_p$ |
| $H_{2b}$ | Human resources are related positively to the capabilities of technology-based firms. | $✓_p$ |
| $H_{2c}$ | Resources dynamism is related positively to the capabilities of technology-based firms. | $✓_p$ |
| $H_{2d}$ | External relationships/networks is related positively to the capabilities of technology-based firms | $✓_p$ |
| $H_3$ | Internal capabilities are related positively to the product innovation strategy of technology-based firms. | $✓_p$ |
| $H_4$ | Product innovation strategy is related positively to the performance of technology-based firms. | ✓ |
| $H_5$ | Internal capabilities are related positively to the market expansion strategy of technology-based firms | $✓^p$ |
| $H_6$ | Market expansion strategy is related positively to the performance of technology-based firms. | x |
| $H_{7a}$ | Internal capabilities are related positively to the remaining-in-private-ownership strategy of technology-based firms | x |
| $H_{7b}$ | Internal capabilities are related negatively to the acquisition strategy of technology-based firms. | n/a |
| $H_{8a}$ | The remaining-in-private-ownership strategy is related negatively to the performance of technology-based firms. | x |
| $H_{8b}$ | Acquisition strategy is related positively to the performance of technology-based firms. | n/a |
| $H_{9a}$ | Internal capabilities are related positively to the strategy flexibility of technology-based firms. | $✓_p$ |
| $H_{9b}$ | Strategy flexibility is related positively to the performance of technology-based firms. | x |
| $H_{10a}$ | Industry competition affects the performance of technology-based firms. | x |
| $H_{10b}$ | External environment affects the performance of technology-based firms. | ✓ |
| $H_{11}$ | Human capital is related positively to the performance of technology-based firms. | ✓ |
| $H_{12}$ | Available finance is related positively to the performance of technology-based firms. | ✓ |

*$✓_p$ indicates a partial support for the hypothesis; n/a: not available*

Compared with the results from samples of the New Zealand technology-based firms (in Section 5.9.2 Figure 5.1), the current path model (Figure 1) reveals both similarities and

differences. First of all, the resources identified in the conceptual model have similar effects on the capabilities. Though the effects on capabilities were not exactly the same as for the New Zealand-only samples, the model proves the importance of these resources to capabilities development in both countries. Secondly, innovation and human capabilities are once again found to have significant impacts on growth strategies. The New Zealand model in Section 5.9.2 shows that marketing capability has a significant relationship to product innovation strategy, but this effect was not apparent in the all-responses model. Thirdly, product innovation strategy and remaining-in-private-ownership were the strategies found to be significant in the New Zealand model, but the results using all responses show greater effects of strategy on performance. Market expansion strategy was also found to have a significant relationship to performance. Mediation analysis was conducted only between market expansion strategy and product innovation strategy. The results show a partial-mediating effect of product innovation strategy on market expansion strategy, thus the all-responses model provides stronger support for market expansion strategy. Similarly, the external environment effect was found to have a negative influence on performance, however this model found a negative significant relationship between human capital barriers and performance, but not between financial barriers and performance as was found in the New Zealand model in Figure 5.1. This may suggest the all-responses model was influenced by the specific country effect, as New Zealand was strongly challenged by financial barriers while Malaysia was challenged by human capital. Finally, the final $R^2$ ($R^2$=0.348) of this all-responses model is slightly lower than in the New Zealand samples ($R^2$=0.450). Again, the lower predictive power of this all-responses model could be due to the effects of differences between the two countries sampled. However, the $R^2$ value of the all-responses model is slightly higher than in the regression model of performance outlined in Table 7($R^2$=0.31). As mentioned in section 5.9.2, this is because the structural model path analysis accounted for all the structural paths affected while the regression model accounted only the independent variables assumed to have a direct effect on performance.

**Figure 1 Structural Model Results for All Responses (N=163)**




*Note:*p<0.05; **p<0.01; ***p<0.001, ns=not significant*

## Differentiating High-growth Firms and Non-high-growth Firms

This section aims to differentiate high-growth firms from non-high-growth firms not only by examining the firms' backgrounds but also from responses to the conceptual model developed from the qualitative case studies (Figure 4.1). The analysis for this section involves two groups in the sample: high-growth firms and non-high-growth firms. All the high-growth firms in Malaysia and New Zealand were combined in the aggregated high-growth group, while the non-high-growth firms in the two countries formed the aggregated non-high-growth group. There were 80 firms in the aggregated high-growth category and 83 firms in the aggregated non-high-growth group. First, the chi-square test and Fisher's exact test were used to see if there was a difference between high-growth firms and non-high-growth firms in a particular characteristic. This is similar to what was done in Section 5.3 but that was conducted on country differences. If there is a difference between growth groups, the significance value (p) must be less than 0.05. The number of responses and the percentage (in brackets) are reported in the growth category columns. Results are shown in Table 9.

**Table 9 Sample Composition**

| Profile | HG (N=80) | Non-HG (N=83) | Pearson's Chi-square test statistics | Difference |
|---|---|---|---|---|
| **Country** | | | $\chi^2$ (1)=1.779, p=0.182 | No |
| New Zealand | 50*(62.5)* | 60*(72.3)* | | |
| Malaysia | 30*(37.5)* | 23*(27.7)* | | |
| **Founder?** | | | $\chi^2$ (1)=0.474, p=0.491 | No |
| Yes | 60*(75)* | 66*(79.5)* | | |
| No | 20*(25)* | 17*(20.5)* | | |
| **Highest Academic Qualification** | | | *Fisher's exact test value =10.399, p=0.06 is reported as 2 cells have expected count less than 5.* | No |
| Less than high school cert | 0 | 5*(6.02)* | | |
| High school certificate | 10*(12.5)* | 20*(24.01)* | | |
| Diploma/certificate | 5*(6.25)* | 7*(8.43)* | | |
| Bachelor degree | 41*(51.25)* | 30*(36.14)* | | |
| Master degree | 16*(20)* | 14*(16.87)* | | |
| PhD or other doctorate | 8*(10)* | 7*(8.43)* | | |
| **Team Founding** | | | $\chi^2$ (1)=0.862, p=0.353 | No |
| Yes | 51*(63.7)* | 47*(56.6)* | | |
| No | 29*(36.3)* | 36*(43.4)* | | |
| **Board Position** | | | $\chi^2$ (4)=17.958, p=0.003* | Yes |
| None | 39*(48.75)* | 47*(56.63)* | | |
| One | 5*(6.25)* | 17*(20.48)* | | |
| Two | 15*(18.75)* | 11*(13.25)* | | |
| Three | 10*(12.50)* | 3*(3.61)* | | |
| Four or more | 11*(13.75)* | 5*(6.02)* | | |
| **Firm Age Group** | | | *Fisher's exact test value =12.374, p=0.03*** *is reported as 1 cell has expected count less than 5.* | Yes |
| 5 years and below | 9*(11.25)* | 10*(12.05)* | | |
| 6-10 years | 22*(27.5)* | 17*(20.48)* | | |
| 11-15 years | 23*(28.75)* | 21*(25.3)* | | |
| 16-20 years | 7*(8.75)* | 18*(21.69)* | | |
| 21-25 years | 10*(12.50)* | 2*(2.41)* | | |
| More than 25 years | 9*(11.5)* | 15*(18.07)* | | |

| Profile | HG (N=80) | Non-HG (N=83) | Pearson's Chi-square test statistics | Difference |
|---|---|---|---|---|
| **Full time employees** | | | $\chi^2$ (3)=10.314, p=0.016* | Yes |
| 10 and below | 27*(33.75)* | 47*(56.63)* | | |
| 11-50 | 33*(41.25)* | 25*(30.12)* | | |
| 51-150 | 15*(18.75)* | 6*(7.23)* | | |
| More than 150 | 5*(6.25)* | 5*(6.02)* | | |
| **Business Structure** | | | *Fisher's exact test value* | No |
| Sole proprietor | 0 | 7*(8.43)* | *=10.930 p=0.056* | |
| Partnership | 3*(3.75)* | 2*(2.41)* | *is reported as 5 cells have* | |
| Private firm | 69*(86.25)* | 70*(84.34)* | *expected count less than* | |
| Public firm | 7*(8.75)* | 3*(3.61)* | | |
| Business subsidiary | 1*(1.25)* | 1*(1.2)* | | |
| **Major customer type** | | | *Fisher's exact test value* | No |
| Other businesses | 54*(67.5)* | 56*(67.47)* | *=0.323, p=0.974* | |
| Government | 7*(8.75)* | 8*(9.64)* | *is reported as 2 cell has* | |
| Consumers | 16*(20)* | 15*(18.07)* | *expected count less than* | |
| Other business consumers | 3*(3.75)* | 4*(4.82)* | | |
| **Major customer location** | | | *Fisher's exact test value* | Yes |
| Domestic | 48*(60)* | 71(85.54) | *=14.227, p=0.000* | |
| Overseas | 25*(31.25)* | 11(13.25) | *is reported as 1 cell has* | |
| Equal | 7*(8.75)* | 1(1.21) | *expected count less than* | |
| **Government Assistance** | | | $\chi^2$ (1)=2.345, p=0.126 | No |
| Yes | 50*(62.5)* | 42*(50.6)* | | |
| No | 30*(37.5)* | 41*(49.4)* | | |
| **External Networking** | | | $\chi^2$ (1)=3.769, p=0.052 | No |
| Yes | 63*(78.75)* | 54*(65.1)* | | |
| No | 17*(21.25)* | 29*(34.9)* | | |
| **Growth Desire** | | | *Fisher's exact test value* | Yes |
| Stay the same size | 4*(5)* | 11*(13.25)* | *=23.30, p=0.000** | |
| Slow growth | 8*(10)* | 15*(18.07)* | *is reported as 1 cells have* | |
| Moderate growth | 32*(40)* | 47*(56.63)* | *expected count less than* | |
| Substantial growth | 36*(45)* | 10*(12.05)* | | |

**p<0.05; ** p<0.01*

These results are similar to those in Table 5-1 in Section 5.3 except in a few characteristics. First of all, it was found that there were no differences in team founding, government assistance and external networking characteristics between high-growth and non-high-growth firms. Secondly, it was found that high-growth firms had more customers in the overseas market than the non-high-growth firms, but this difference was not found in the comparison between countries. This result further supports the finding from Study 1 that the majority of the high-growth firms have strong presence in overseas markets. Similarly, the founders' education, which was significant in the country comparison, was found to be non-significant in the comparison between growth groups. Nevertheless, some characteristics which were evidently different between countries were found to be significantly different between the two growth groups. CEOs of the high-growth firms were found to hold more board positions in other organisations than the CEOs of non-high-growth firms. In addition, the majority of high-growth firms were established in the last 15 years while a higher percentage of the non-

high-growth firms were older than 15 years. The aggregated high-growth group was found to have more employees than the aggregated non-high-growth group. Finally, it is no surprise that high-growth firms have stronger growth desires than the non-high-growth firms. It is important to note the difference in sample composition between the two countries. New Zealand had more samples from the aggregated non-high-growth group while Malaysia had more samples from the aggregated high-growth group. The difference in sample weightage might have slightly skewed the results towards a particular group of samples. By taking out the country effect, as demonstrated in Table 5-1 in Section 5.3, the significant differences between the aggregated high-growth and non-high-growth groups were found to be major customer location and growth desire. Thus, it can be concluded that high-growth firms from both countries have more customers from overseas and a greater desire for growth.

Subsequently, results from the regression analysis in the earlier section were used to form path models for the different growth groups. The criteria of the PLS graph were followed with similar statistical procedures conducted. Figure 2 shows the results of the structural model of aggregated high-growth firms while Figure 3 shows the aggregated non-high-growth results. Compared to Figure 1, the aggregated high-growth group model has higher predictive power, with $R^2$=0.461 on performance. This is similar to what was found in Section 5.9.4 with the New Zealand samples. These findings provide evidence that the conceptual model developed from the qualitative study is more suitable for high-growth technology-based firms than for the aggregated non-high-growth group, regardless of the country effect.

The market expansion strategy, which was found to have a significant relationship to performance in the all-responses model, failed to provide a consistent result when the samples were split according to growth category. This strategy had no significant impact on performance in either growth group. The performance of the aggregated high-growth group was explained by product innovation strategy, remaining-in-private-ownership strategy, external environment effects and human capital barriers. On the other hand, the performance of the aggregated non-high-growth group was found to have a significant relationship only with product innovation strategy. This is quite similar to the findings in the New Zealand high-growth and non-high-growth firms' analysis in Section 5.9.4. Product innovation strategy and remaining-in-private-ownership are the main strategies that affected performance in the high-growth and non-high-growth New Zealand samples. Financial

barriers which were found to have significant relationships in the New Zealand high-growth firms, as explained in Figure 5.3 (Section 5.9.4), were not significant in the aggregated high-growth model. This is probably because financial barriers are relevant to New Zealand firms only regardless of growth category, but the aggregated high-growth group is also influenced by the Malaysian samples. As suggested in the earlier section of this appendix, the all-responses model shows that New Zealand firms are strongly challenged by financial barriers while Malaysian firms are strongly challenged by human capital barriers.

**Table 9 Summary of Hypotheses**

| | ***Hypothesis*** | ***HG*** | ***NHG*** |
|---|---|---|---|
| $H_{1a}$ | Government policies influence technology-based firms' ability to use resources dynamically (resources dynamism). | x | ✓ |
| $H_{1b}$ | Human resources influence technology-based firms' ability to use resources dynamically (resources dynamism). | ✓ | ✓ |
| $H_{1c}$ | External relationships/networks influence technology-based firms' ability to use resources dynamically (resources dynamism). | x | x |
| $H_{2a}$ | Government policies are related positively to the capabilities of technology-based firms | $✓_p$ | $✓_p$ |
| $H_{2b}$ | Human resources are related positively to the capabilities of technology-based firms. | $✓_p$ | $✓_p$ |
| $H_{2c}$ | Resources dynamism is related positively to the capabilities of technology-based firms. | $✓_p$ | $✓_p$ |
| $H_{2d}$ | External relationships/networks is related positively to the capabilities of technology-based firms | $✓_p$ | $✓_p$ |
| $H_3$ | Internal capabilities are related positively to the product innovation strategy of technology-based firms. | $✓_p$ | $✓_p$ |
| $H_4$ | Product Innovation strategy is related positively to the performance of technology-based firms. | ✓ | ✓ |
| $H_5$ | Internal capabilities are related positively to the market expansion strategy of technology-based firms | $✓_p$ | $✓_p$ |
| $H_6$ | Market expansion strategy is related positively to the performance of technology-based firms. | x | x |
| $H_{7a}$ | Internal capabilities are related positively to the remaining-in-private-ownership strategy of technology-based firms | x | x |
| $H_{7b}$ | Internal capabilities are related negatively to the acquisition strategy of technology-based firms. | n/a | n/a |
| $H_{8a}$ | The remaining-in-private-ownership strategy is related negatively to the performance of technology-based firms. | x | x |
| $H_{8b}$ | Acquisition strategy is related positively to the performance of technology-based firms. | n/a | n/a |
| $H_{9a}$ | Internal capabilities are related positively to the strategy flexibility of technology-based firms. | x | $✓_p$ |
| $H_{9b}$ | Strategy flexibility is related positively to the performance of technology-based firms. | x | x |
| $H_{10a}$ | Industry competition affects the performance of technology-based firms. | x | x |
| $H_{10b}$ | External environment affects the performance of technology-based firms. | ✓ | x |
| $H_{11}$ | Human capital is related positively to the performance of technology-based firms. | ✓ | x |
| $H_{12}$ | Available finance is related positively to the performance of technology-based firms. | x | x |

*$✓_p$ indicates a partial support for the hypothesis; n/a: not available*

Analyses in Section 5.9.3 found that high-growth New Zealand samples had higher path co-efficient for the relationship between challenges and performance than the non-high-growth group did. A similar conclusion can be drawn from the aggregated high-growth and non-high-growth groups. High-growth technology-based firms were found to implement product innovation strategy and have more ability to overcome growth challenges from their internal and external environments. The lesser performance of the non-high-growth model can only be explained in this study by the product innovation strategy factor. By using the results from path analysis, the summary of hypotheses based on aggregated high-growth and non-aggregated high-growth groups is shown in Table 9.

Adopting the same analytical approach, the results outlined in this appendix are similar to those explained in Chapter 5. Apart from some differences between the related dimensions, the results further enhance the findings of the main thesis. First analysis of all responses (regardless of country or growth category) received from the survey shows that the resources, capabilities, strategies and challenges identified in the qualitative study are relevant to the performance of technology-based firms in both countries. Although the country effect weakens some of the relationships between the dimensions according to the regression analysis, the major findings outlined in Chapter 5 are relevant to this appendix. Nevertheless, the aggregated high-growth and non-high-growth path analysis supports the findings for New Zealand high-growth and non-high-growth technology-based firms. The effects on performance were identified and successfully differentiate high-growth firms from the others. Although this appendix examines the responses from a different perspective, the outcomes are similar to those in the main thesis.

**Figure 2 Structural Model Results for Aggregated High-Growth Firms (N=80)**

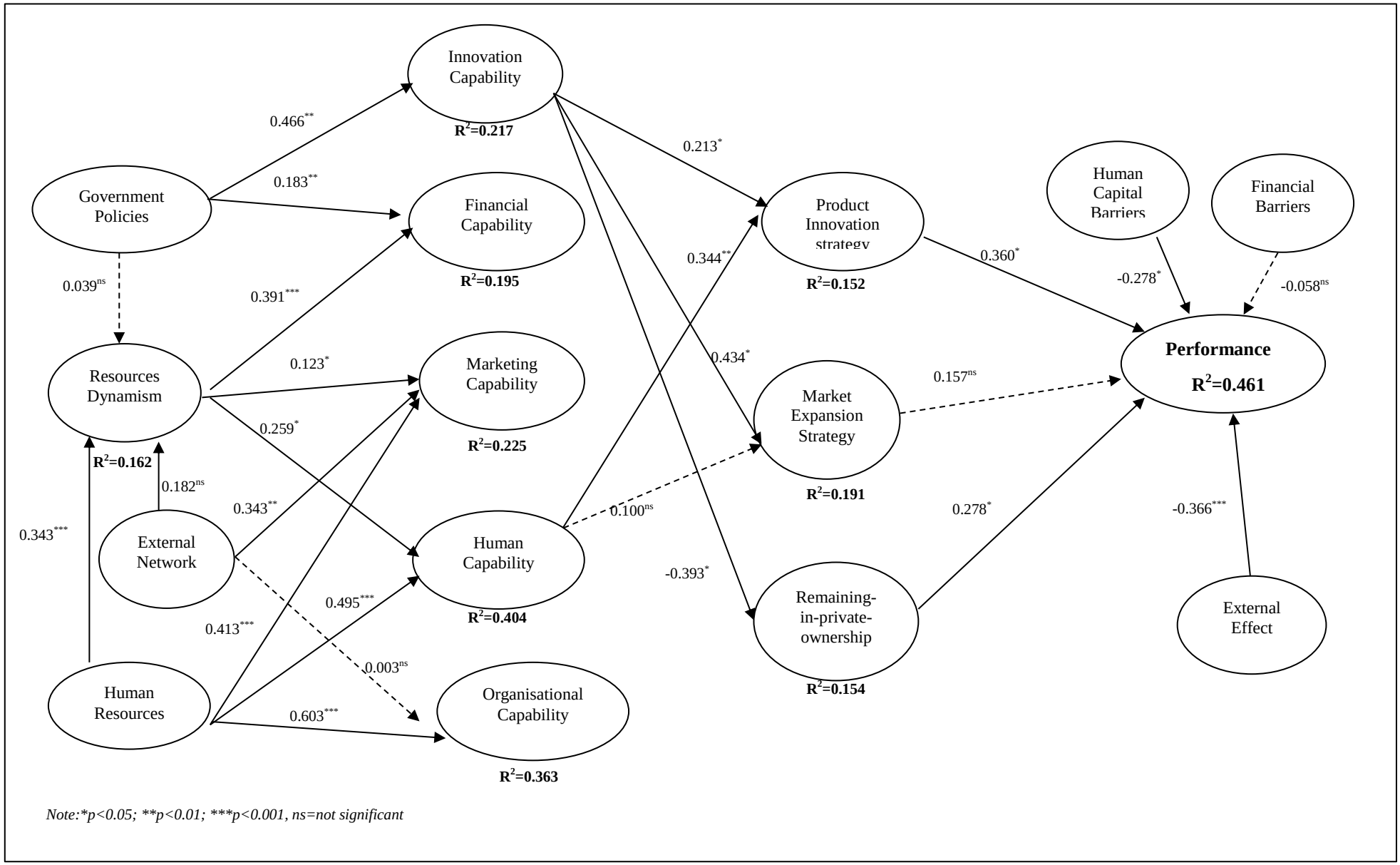


**Figure 3 Structural Model Results for Aggregated Non-High-Growth Firms (N=83)**